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Edited by H. G. S. Wallace

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U. S. S. "CALIFORNIA"

This photo, which was made from the air, shows the flagship of the U. S. Battle Fleet at anchor in the harbor at San Diego, California.

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THE PART OF ENGINEERING IN COMMAND

By Rear Admiral John K. Robison, Engineer-in-Chief, U. S. Navy

The general subjects of naval doctrine and the preparation of naval plans for operation and action were in a nebulous state at not so remote a period as to be beyond the recollection of a great many officers still on the Active List. Captain Mahan's deduction of the fundamental facts and principles underlying sea power, its foundation, development and exercise, was still under way at the Naval War College less than thirty years ago. Today officers have come to realize the necessity of carefully prepared plans, and general indoctrination has advanced far enough to make the skilful execution of these plans the rule rather than the exception. This fact is undoubtedly due to the Naval War College, and that institution has gained the deep appreciation, friendship, and respect of the entire naval service—not so much, perhaps, by what is taught there as by the success that has been achieved through stimulation of its graduates who have applied the basic principles of organization, logistics, command, strategy and tactics. These principles are developed by the technical study of naval history at the War College, and are today being applied in all of our fleets and in all the usual and regular work of the navy.

The concrete effect of the War College upon the navy may be said to include the development of the initiative of the subordi-

nate, and the making of that initiative conditional upon a thorough indoctrination of the subordinate. The introduction of the conference system not only improves the information of the commander, but secures that complete familiarity of the subordinate with the methods and plans of his superior that is necessary for the accomplishment of those plans. The individual study of tentative naval doctrine and the development of this doctrine as a result of its general study; the art of screening and scouting; the development of tactical plans; and the familiarity of the personnel of the fleet with the details of the execution of those general tactical plans; the formulation of general naval plans for the national defense—all can be directly traced to the development of a general consciousness of the necessity for logical reasoning, which has usually and properly been ascribed to the influence of the Naval War College upon the character of the naval personnel.

In the search for the abstract and unchangeable truths upon which alone sound deductions can be made, no small number of conscientious students have been diverted from consideration of the concrete facts—"engineering" facts, if they may be termed such—upon which accomplishments are to be based. The neglect of the concrete is a danger. Engineering in the broadest sense, so far as the navy is concerned, is the common sense that must be used in applying philosophy of the War College to the navy's general mission as well as to the routine problems of each day.

Everyone is familiar, in a general way, with the service that engineering is to the nation and to the navy, but in order to show the necessity of the possession by naval command of engineering experience it may be desirable to refer to a few of these services so that the conclusion will be obvious.

He who looks upon the engineer as the "human creator"—the one who multiplies the power of man by placing in his hands tools created by skill from otherwise useless material—makes a serious mistake. The engineer is worthy only to the extent his effort is dominated by the spirit of service for the good of others. The supreme act of creation was the breathing of the spirit of life into inanimate, molded clay. Today naval engineering creations derive value from the spirit of service breathed

into material things created by skill that these may become living forces for the betterment of the navy.

Studies of the practical application of the art of war, and particularly the actual exercise of command of naval units, must include thorough consideration of practical possibilities and limitations. In other words, the thought and the exercise of naval command, and the preparation therefor, must be directly connected with practical engineering problems such as occur in the naval officer's everyday life. Engineering includes two considerable divisions—operation and design. In our navy, the operating function is distinctly that of a line officer. At the same time, the character of the design affects the ease, reliability, and even the character, of the operation.

More and more is engineering experience necessary to wise decision by naval commanders. The scope of the engineer is widening. No one can safely prophesy limitations of the engineer's accomplishments. Even today one must be constantly informed both as to practice and as to future prospects, in order to appreciate the facts and thus be able to make an accurate estimate of the situation such as is always necessary before a wise decision can be reached. It is necessary today, in coping with the major problem of the national defense against a putative enemy, to appreciate what the enemy forces may be able to accomplish ordinarily, as well as to understand what the enemy may be able to produce or acquire under the stimulus of war operations. It is necessary, in the same way, to understand what our own people can do today, or under the stress of war. In order, therefore, that officers exercising high command, or training themselves for fitness for exercise of high command, in our navy, may be successful, they should know the difficulties and the possibilities of engineering. To put it tritely, the commander-in-chief should be able to read his signal book in terms of the BTU.

Success in action depends upon personnel and material. From another point of view it depends upon having the best weapons and upon the most skilful use of those weapons. One has only to glance into the present day situation to see that our weapons are almost exclusively those developed by highly skilled and educated engineers. Their operation requires engineering skill that

differs in quality but not in any degree from that of the skill of the designer.

Taking the problem as we have it, our unit of strength in weapons is represented by the ship. The four most important military characteristics of a modern vessel are protection, mobility, offensive power, and communications.

Protection is ordinarily stated as involving armor and hull subdivision, but it should be noted that speed and radius of action contribute to protection both in joining an action with the least possible damage to one's own ship and also in withdrawing from an unfavorable situation as we must do when the odds are unacceptable.

Mobility, in which, in the writer's opinion, should be included speed, radius of action, and economy of operation, is peculiarly and distinctly within the purview of the naval engineer. The matter of radius of action is closely allied with the subject of design and economy of operation. By suitable design and economy of operation, it is often possible through sacrifices of weight and space to add to the offensive power, as of guns, or the defensive power, as of armor. To bring the ship and her offensive power into an advantageous action or out of a disadvantageous action always requires a higher degree of mobility than that possessed by an alert enemy whose initial situation is as good as ours.

In *offensive power,* there should be included guns, torpedoes, and their appurtenances, all of which are distinctly the product of the designing engineer. The power to operate offensive weapons is derived from the same source as that which gives speed to the ship. Improvements brought about by the designing engineer may improve the offensive power. The guns and the fire control apparatus cannot arrive at the desired range without mobility. After the action is started the offensive power is of no value without the auxiliary power that is universally depended upon to operate them and this is furnished and handled by the engineer.

There are only three important long range methods of *communication* now in use, all of which are the product of engineering skill. The methods referred to are radio installations, signal searchlights, and the submarine oscillator.

Strategical and tactical success depend so directly upon communications that the writer has ventured to include these among the major military features of the naval unit. Communications determine the extent to which effective command can be exercised. Aside from indoctrination by education, association, or battle orders and instructions issued before the event, the only way in which the entire force of the whole fleet can be brought to bear at the point where the fleet commander desires this force to be applied, is through communications addressed to him by his scouts and observers, and addressed by him to his subordinates. The difference between a mob and a fleet is very largely a matter of communications. All of which, as must be manifest, is the product of engineering skill.

It takes no extravagant use of the imagination to appreciate the importance of engineering in giving to these four major abstract ship characteristics their power. No flight of fancy is necessary to show the vital interest of high command in engineering problems of the present day. Not only must high command have a knowledge of engineering problems, but the engineer must have a knowledge of the desires of high command. The two are inseparable. This is the logical reason for line officer engineers in all ranks.

From a little broader point of view than that of the individual ship, naval officers are taught that an advantageous strategical situation is created by location of forces not yet in action in such places, relative to the location of the enemy force, that the enemy will be confronted with a situation disadvantageous to him. Strategy is a geographical disposition of forces. It is impossible to accomplish an advantageous strategical disposition without superlative mobility. A few hours in time may be gained by superior speed. Nelson said five minutes may spell the difference between victory and defeat. A few miles in distance may be gained by superior radius of action. Strategical disposition therefore depends directly upon practical engineering considerations.

Logistics, and speed, and radius of action are inseparable whatever the type of ship. Economy of operation, and economy of design, enable a fleet to take up a strategical position that would otherwise be impossible on account of fuel consumption. The

amount of fuel consumed by a fleet of today engaged in an active campaign, especially an overseas campaign, is colossal. A small percentage of saving in the logistic requirements may mean the winning of a strategical position. It may permit the execution of some particular project. This again is distinctly an engineering problem and it is a direct and determining factor upon the character of plan that can be successfully accomplished.

It was a proper solution of a practical engineering problem that enabled the *Oregon* to join our other fighting forces in the Spanish-American War. It was the same solution of an engineering problem that enabled the slow battleship *Oregon* to overhaul and destroy the fast cruiser *Colon*. The *Oregon* did not possess men of more courage or patriotism than the men on the *Colon*, but the *Oregon* had solved an engineering problem and the *Colon* had not.

What but a proper solution of engineering problems enabled our transportation of troops and supplies to be handled in convoys during the World War? And the "We are ready now" of Taussig is but a statement that the engineering problems had been estimated, and a satisfactory solution had been found.

It is not sufficient for the flag officer or the commanding officer to know by painful experience, after it is too late, that his fleet or ship cannot take up an advantageous strategical position. He should be able to appraise the probability beforehand.

In joining action, certain tactical dispositions are desirable. Certain positions of aircraft, submarines, battleships, cruisers and destroyers are desirable, relative to the enemy's positions. Meanwhile communications must be preserved at distances that sometimes are very large. In the old days the weather gauge was of great tactical advantage; today the man in the fireroom is always beating to windward. The weather gauge has shifted to the steam gauge.

When we read of the engagement of the *Constitution* with the *Cyane* and *Levant*, what American can fail to be thrilled on reading of how the *Constitution*, fighting against two hardier antagonists, raked each in turn, and herself, by superb handling, escaped being raked by either of her antagonists? It was a remarkable illustration of what complete and thorough knowledge of the

motive power may accomplish. Today, by similar superior skill equally great tactical successes are available.

In order to achieve an advantageous tactical position, it is absolutely necessary that the operation of the engines and their design should be superlative, otherwise the guns and torpedoes will never come into best use. Speed makes difference between offensive and defensive tactics. To maintain an advantageous tactical position for a considerable length of time requires nice regulation of the speed, and that the motive power be reliable and economical. It is not enough for a flag officer or a commanding officer to know that his ship did not achieve a particular tactical position of advantage. He should know from personal appreciation of his ship what his limitations are and what the possibilities are. He should know whom to praise for realization of the possibilities and whom to blame for failure to achieve results within the range of accomplishment.

In naval warfare more than in any other activity, one is always told to "nurse his assets." The old order to save your powder until you can see the whites of their eyes has its parallel in the present day. In the last analysis, this parallel is due to the limitations of machinery. The commander of a fleet or the captain of a ship needs speed and endurance and reliability at the required time; he must have these at his command. In order that he may wisely depend upon having them he must insure that preparations are made by the individuals concerned at the proper time. This amounts, in a practical way, to nothing more than avoiding waste of energy and insuring the upkeep of material.

The character of our navy and its ability to achieve success are involved in these every-day engineering problems. Not only must individuals conserve their energy, and the energy of their material, when expenditure of such energy is unnecessary, but also the conservation must be uniform in character, and must be carried out conscientiously and simultaneously through the entire fleet, in order that the fleet may be able to respond effectively and simultaneously in time of need. This means that conservation of energy at unimportant times is not alone sufficient, nor is upkeep alone sufficient, the two must be conscientiously adhered to and must be performed in accordance with the best practice.

Perhaps there is no better way of indicating the wide effect of

engineering conditions upon the readiness of our navy for whatever service it may be required, than to consider current engineering problems. The naval engineer himself may not entirely realize the importance of the detailed savings accomplished by him until those details are aggregated, and the energy or money previously wasted is shown to have accomplished fleet efficiency.

In the study of naval plans for the national defense, one finds that the success or failure of our own forces in defending the interests of this government invariably depends very largely upon the securing of an ample fuel supply to the fleet. Experience in the recent war showed the enormous number of tankers required in order to conduct with success an active naval campaign. The problem of fuel supply seriously jeopardizes the success of our plans. These plans, however, are based upon present conditions of fuel consumption and supply. If these conditions can be improved, perhaps the plan can be made safely operable. Toward that end, the Bureau of Engineering has instituted such steps as the following.

The supply of fuel oil at Pearl Harbor is being increased by one and a half million barrels. This increase is coming from the royalty oil from Naval Oil Reserves. Similar increase is about to be undertaken at other naval fuel stations. Pearl Harbor came first because there the need is greatest.

The standard fuel of commerce corresponds to the lowest grade of naval fuel oil commonly called "bunker C." This is much more viscous than our standard fuel oil and requires heating to a much higher temperature to become sufficiently fluid for naval purposes. Tests have shown that if heated to these higher temperatures, that are still within the limits of safety, the commercial fuel oil is considerably more economical than our standard oil. Alterations are being made to our ships to enable them to use bunker C fuel oil. This oil costs perhaps forty per cent less, contains about five to six per cent more thermal units, and makes a corresponding increase in the radius of action of every oil burning ship. Primarily, it renders every naval ship able to burn any commercial quality of fuel oil. It improves our supply.

Fuel oil purifiers are being introduced upon our ships similar in design to the lubricating oil purifiers that have proved so suc-

cessful. These purifiers will, by removing the sediment and impurities in fuel oil, increase the capacity of a bunker from one and one-half to three per cent. These small gains may seem of little moment, but one per cent of three million tons is several tankers, perhaps the difference between success and failure. Obviously, if the navy can decrease its consumption of fuel oil a decreased amount will be needed.

Direct efforts have been made to improve economy, the most important steps in this direction being as follows:

A complete manual of approved engineering practice is being written and issued by chapters to the entire service as fast as it can be prepared. The seal of secrecy has been removed from this manual. A report has been received explaining the success that was achieved in reduction of fuel consumption in our destroyers stationed on the Asiatic Station. This report ascribed the entire economies to insistence by the command afloat upon the faithful and complete execution of the bureau's instructions for operation and maintenance of the machinery of these vessels. The system of inspections that forced fidelity to the general plan for operating efficiency was complete and the results are worthy of mention. The average fuel consumption underway per knot was reduced 32-3/10%. The speed was practically unchanged. The average fuel consumption in port was reduced 49-7/10%. There is no reason to believe that similar improvement cannot be achieved throughout the entire service by exaction on the part of command afloat of absolute fidelity to the manual of engineering practice issued by the Bureau of Engineering. In no other way than by insistence on the part of high command can this attainable engineering efficiency be rendered available for the navy. Naval men are of course human, and checking up on their work is necessary. Inspections of the work done should be so thorough that it is easier to do it right than to explain why it was done wrong. Unless we do it today, we cannot expect to secure on demand, when we need it, the fifty per cent increase in our radius of action that may be available by this one means. One whole section of the bureau organization is engaged in keeping our enginering instructions up to date gleaning information from all sources, but particularly from the fleet.

Improvements in design are being made. Evaporating plants

are being renewed with multiple effect low pressure plants that secure decrease in the back pressure on the auxiliary exhaust line with consequent decrease in steam consumption of all auxiliary machinery, the absence of live steam for the operation of these evaporating plants, together with a better grade and an increased quantity of distilled water. On the *Nevada* this installation is complete. It has been made simpler than previous evaporating plants and calculations have indicated that the $45,000 spent on the *Nevada* for this particular improvement added ten per cent to the radius of action of the whole battle fleet. This because the *Nevada* happened to be the battleship of smallest radius.

The dense-air ice machines are being replaced by electrically operated CO_2 machines. We thus double our refrigerating capacity, halve our steam consumption, and, also, have much lighter refrigerating plants.

We are installing electric auxiliary machinery wherever we can to supplement or to take the place of steam-operated machinery. In every case the fuel consumption is very considerably decreased.

While it is the writer's firm belief that details such as have been referred to will halve the fuel consumption of our fleet, it is not claimed that more than one-third will be saved. In the last year an average improvement of twelve per cent has been made. The practicable decrease in the demand for tankers is enormous when the whole problem is taken into account. The solution of the problem of the naval defense of our country will be immediately facilitated by accomplishing such apparently minor, and apparently purely engineering economies in design, and particularly in operation, as have been cited. (It should not be forgotten that every decrease in the size of the train, such as any decrease in fuel consumption involves, increases the size of our combatant fleet by its decrease in the tangential effort required to protect the train. It is a problem in geometrical progression. When we decrease the percentage of the total weight of the naval "spear" that must be devoted to the "staff" of its supply, we increase the weight and strength and character of the spear-head.) This improvement cannot be made by good design and by correct and complete instructions alone. Co-operation is needed. Bad enginering on the bridge must be

avoided, and the mutual support and respect between engine room and deck increased.

There have been several cases of ships fitted with electric steering gear that have failed. The steering gear of the *Tennessee* failed when the ship was under the Williamsburg bridge, and the captain informed me that there was a lively few minutes on board, but that the tugs held on and saved the situation. To avoid a repetition of such accidents, a system has been devised whereby electric storage batteries are made available, so that the steering of the ship will not fail even if all other power is taken off the vessel. The cure effects no improvement in economy, rather the contrary, but it accomplishes safety where before an unnecessary hazard existed.

Similarly, added reliability of machinery is being secured by added shop equipment to capital ships and to tenders; the increased feed water capacity on many ships; the improved drainage facilities for turbines; improved foundations for forced draft-blowers; the simplified steam piping rendered possible by the elimination of steam auxiliaries; improved engines for submarines; and a large number of other similar details every one of which is decided upon solely on the basis of the improvement to the fleet's capacity for accomplishing the naval plans for national defense.

This is the mission of the Planning Section of the Bureau of Engineering. This section carefully digests reports of difficulties in operation, and makes recommendations looking to improvements of any nature which will result in more economical or more reliable operation of the motive power of the fleet. The bureau plans are subordinated to the general plans of the department and really form only a development of these plans. The General Plans Committee of the navy includes one officer from the Bureau of Engineering. The work of this bureau is intended—with a certain total naval force or effect—to increase the amount of that force which is at the points of contact and further to improve the effectiveness of the whole force with particular reference to those units in the battle fleet.

There are a great many improvements that progress in invention is rendering available, and that are being installed as fast as may be possible (experimentally, in the first place) for the

purpose of improving the fleet. Among these are very considerable improvements in radio; improvements in sound apparatus that are enabling the navy to secure continuous soundings, and that may have much wider applications in the future; improvements in the machinery of our smaller power boats, including, particularly, motor-driven life boats. Improvements are being made that have for their end a decrease in the quantity and variety of supplies to be carried; decrease in the weight, space and complexity of machinery; increase in the ease of overhaul, etc. Everyone of these changes is designed to make the fleet more reliable, more efficient, and, in general, to use the words of our present Secretary, more nearly "fit and ready."

One of the subjects of vital importance to the navy at the present time is aviation. Successful aviation demands the development of efficient, light, high power engines which must be thoroughly reliable in every particular. The most experienced engineers now on duty at that bureau are engaged in the solution of this problem, and it is believed that the results will be very satisfactory. They have not yet been attained, but the probability is that they will be.

To illustrate the importance of a small item, take the case of the *Maryland*. By installing a Diesel engine for port use, the main power plant may be shut down, all the electrical energy necessary is cheaply provided, and the heat from the engine is sufficient to furnish, at no additional cost, a large amount of distilled water. This distilled water is, to all intents and purposes, a free by-product.

It may seemingly be inappropriate to introduce the subject of money, but though the dollar is in itself nothing, yet in the aggregate dollars measure the degree of readiness that we can secure. It is unwise and hardly within the province of naval men to criticise the Congress for failing to give larger appropriations than they do. The navy's final mission is the execution of the policies of the country when the ordinary methods of diplomacy fail. After some of us have performed the duty of explaining the navy's needs, the policy of the United States is made manifest to us annually in the appropriation acts for the support of the navy. The criticism of the naval officer should be directed against the naval representatives, most of whom are

heads of material bureaus at the Navy Department, when these officers fail to present the naval needs completely or correctly to the Congressional Committees. It seems to the author that naval officers have no right to criticize the Congress for its action—be that wise or not wise; but they have an undoubted right to criticize their own representatives when these men fail to do their duty in representing, fully and frankly, naval needs and conditions to the Congress. These bureau chiefs are naturally more likely to receive approbation from their fellow officers than any constructive criticism that may enable them better to perform their duties.

One of the principal duties of naval men is to furnish as much navy as possible for the dollars that are appropriated. In pursuance of this idea waste has been stopped and funds available under the control of the Bureau of Engineering have been diverted as much as possible to material service of the fleet. Details include the use of material already on hand whenever practicable, the development of the idea of self-maintenance afloat, the placing of commanders-in-chief upon a fuel allowance, the giving of a money allowance to the commander-in-chief for distribution, in accordance with his desires for the purchase of materials, so that he, who from his position is best qualified to decide the imminent needs of the units of his command, may distribute it as he thinks best. All these have combined to enable the Bureau of Engineering to place more material upon the vessels of the fleet than would have been found practicable without the foregoing co-operation between high command afloat and the Bureau of Engineering.

It is the hope, and plans made so far are being accomplished, to continue the improvements during the fiscal year that is just starting. There is available during this year less than $15,000,000 for the service of the machinery of the fleet. It is hoped, with this sum, that as much material will be put into effective use upon the ships of the navy as was possible two years ago, with more than twice this total expenditure for the same purpose. Expenditures ashore for navy yard developments, and for inspection and similar service, are naturally suffering. Expenditures for tests, experiments, and developments are not being decreased.

Instant decisions must be based upon personal experience and knowledge. Perhaps the wisest decisions follow quite extended conferences with a staff of experts, with the commander-in-chief as the arbiter. This sort of conference with experts takes a great deal of time, and to such as Napoleon or Nelson *time* is the key to success. Many a great defeat has been caused by deliberation before reaching a conclusion that personal experience might have enabled the commander-in-chief to reach at once.

In view of the fact that the decisions arrived at in many estimates of situations arising during war, must be based upon engineering knowledge, it seems vitally important that engineering training should be considered an essential requirement in the preparation for high command. The efficiency of the navy depends upon the acceptance of the principles that operation and maintenance of machinery afloat is a function of the regular line officer. Every line officer must be made capable by proper training to perform engineering duty commensurate with his rank. The officers selected in accordance with the authorization of law for "engineering duty only" provide the expert technicists required for engineering design and inspection, but it was not intended, nor is it well, that these officers should supplant the regular line officers in the operation and maintenance of machinery afloat. Our navy possesses a distinct advantage over other navies of the world, in that our regular line officers receive training in engineering, and the application of the principles of that science constitutes an important part of their duties.

In this connection it should be noted that the duty of an officer on board a modern battleship in every department, requires an accurate comprehension of the principles of engineering in its broadest sense. The course of instruction at the Naval Academy provides the theory, but it is necessary to supplement this instruction by practical training, and it is submitted that no duty afloat is more important than duty in the engine room for this purpose. Indeed, the opportunity to perform this duty is a great American naval chance to attain superior fitness and better command of our ships and fleets. Our captains, when considering engineering conditions, do not merely see tables of statistics and curves of performances: they see men toiling and accomplishing.

The efficiency of the navy is now suffering from a fallacious idea on the part of some younger officers, that engineering duty can be neglected without interfering with their development for high command. The existence of this belief is causing scarcity of officers capable of operating and maintaining the machinery afloat, a very serious condition which is now receiving the earnest consideration of the department. The senior officers of the navy are responsible to a great degree for this state of affairs. The attitude of senior officers determines the conduct of their subordinates. Engineering duty, which should be included in at least the first twenty years of the professional life of every line officer, will be accepted with liking and performed with zeal according to the respect for engineering shown by senior officers in the service.

In this connection attention is invited to the grave responsibility that rests upon the senior officers of the navy as regards the molding of the character of the younger officer. The navy is an enduring institution, its development is continuous, its spirit is a matter of association and example, as well as of tradition. What the captains say and do today determines the military character of the naval leaders of tomorrow. There should be a general accentuation of the importance of younger officers fitting themselves for important technical duties on board ship. It is feared that some of these young men have received a wrong impression of the naval teachings. In the stressing of the superiority of personnel over material, some of these young men have failed to appreciate that real ability and knowledge of technical material is an essential attribute of leadership. The members of a football team have very little respect for a team captain who does not know the game. Without this respect his efforts at leadership are futile.

Without failing in respect for abstract knowledge, it may well be emphasized that engineering duty requires direct contact with men, involves their leadership, and develops such traits as prompt decision, foresight, initiative and patience. Self-maintenance of the fleet is perhaps of most value because it strengthens the character of our personnel, for men always are more important than their tools.

Postgraduate instruction is of more value through the supply of ideas from outside sources that is thus secured, than in the award that it gives to officers that are allowed this opportunity to increase their ability.

The ideal must always be kept lighted up by ambition and hope. But ideas develop from facts. Details may wisely be left to subordinates if general principles are well understood by all hands. In creating ideas we start with molded facts and, breathing ourselves the spirit of service, strive to animate our facts by putting some of this same spirit into what was at first inanimate—dead. It is the quality of the spirit that possesses us, and that we transmit, that counts. The morale officer is the captain. He is the one who determines the spirit of the ship and in the long run it is he who is responsible for the very character of our personnel. The example and teachings of officers assigned to important sea duty go far toward molding the character of our younger officers. It is a great privilege but a solemn responsibility.

It is desirable to dignify all essential duties. The high ranking officer can inspire zeal by pointing out the opportunity of definite constructive service for the advancement of the interests of the whole fleet to the man in the dynamo-room, the fireroom, or the engine room; or to the senior charged with administration and improvements. The effect is bound to improve the service.

It is hoped that there has been indicated, in the foregoing pages, that there are many so-called purely material duties that will furnish ample field for foresight, and for the application of the principles and plans for the national defense. Engineering is service, and in the long run the *giving* of service makes for happiness as well as for the worth all naval men seek, that they may become worthy of those that have gone before.

DISCUSSION

The Part of Engineering in Command

REAR ADMIRAL HENRY B. WILSON, U. S. NAVY.—This article was referred to me with a request for a discussion. The article is timely but must be read with reservations, having due regard that Admiral Robison, my very good friend, is publishing this in the nature of a "sales talk," to interest young officers in engineering duty.

I say it is timely because it is common service gossip that certain officers have failed of selection because of "too much engineering duty." This may or may not be true. In my own experience on various Boards of Selection I have seen none passed for that direct reason. Some officers may have sought engineering duty repeatedly and have stayed in it so long, proportionately, as to fall behind their classmates in all around professional attainments, which may thus have caused engineering indirectly to shoulder the blame. This rumor has no doubt convinced certain young officers against seeking engineering duty. On the other hand, officers must perform whatever duty is assigned them and, especially in considering young officers, an officer's assignment is seldom his for the seeking. Unquestionably a senior much prefers giving a junior what he desires if feasible. This article is valuable in that it may turn more young officers toward seeking engineering duty to such an extent as to give them a well-rounded experience before reaching command rank.

I believe too that he should differentiate between engineering and marine engineering. True, as Admiral Robison says, many weapons are triumphs of engineering skill, but not necessarily marine engineering. Something of a similar nature might be said of his adoption of the communication service. As a far fetched example: pigeons are under the cognizance of the Bureau of Engineering, but it can scarcely be maintained that engineering experience is necessary for the care and upkeep of a pigeon. By all means let there be sufficient engineering training, but let us not lose our sense of proportion.

I believe that Admiral Robison has shown a commendable and quite common fault, in that he places his particular assignment supreme. In the Service, no one component of a fighting unit can be supreme. In his reference to the *Oregon's* and other triumphs of Engineering, he neglects to give any credit to the hull designers who built the ship on lines suitable to the propelling plant's power. Nor does he give the captain or the navigator credit for having chosen courses saving in fuel. And so I might go on, down to the ship's cooks who burned the galley fires economically that more coal might be available for steaming. *Reductio ad absurdum.*

In short, a successful fighting unit must be a fine example of team work. Admiral Robison has mentioned the four components. Each of these components is indispensable to the others. Supposing that the *Oregon* did make a wonderful engineering performance, of what avail was it save to carry armament to where it could be used? Conversely, of what avail would this armament have been unless the machinery had placed it where it could be used? We may liken a ship to a fencer. Communications are his brains and eyes, engineering his feet, offensive power his foil and hand, protection his mask and pad. A fencer equipped with all of these, meeting one similarly and as effectively equipped, will win if his skill and training are superior. So it is in the navy. A unit must have the four elements in proper proportion for success. A preponderance of any one causes a corresponding weakness in the others. Each is indispensable to success. Each is important. Each is vital. Excessive training in any one branch will cause a corresponding deficiency in the others. We must have trained engineers, but so must we have trained navigators, trained communication officers, trained ship handlers, trained gunnery officers, and so on through all the links of the chain of which each link must be strong, and not the least of these is a trained, capable captain, who can and does keep a happy, contented, earnest crew, full of enthusiasm for doing their particular mite toward making their ship the best ship in the thousand and one ways a ship can be successful, or unsuccessful.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

DESTROYER EXPERIENCES DURING THE GREAT WAR[1]

By Captain J. K. Taussig, U. S. Navy

III. CONVOYING MERCHANT SHIPS

Being an account of the American forces employed, the transition from patrol system to convoy system, the organization, administration, and operation of a convoy, together with certain personal experiences and incidents that befell the writer.

The Queenstown Forces

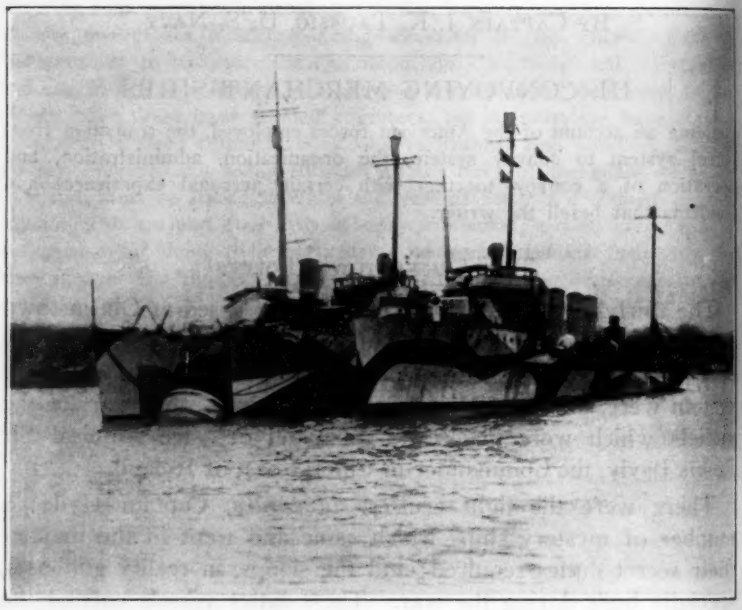
The thirty-five United States Destroyers based at Queenstown during the spring and summer of 1917, when the patrol was in operation, and during the transition from patrol system to convoy system were, numerically, only a comparatively small part of the vessels which were under the command of Vice Admiral Sir Lewis Bayly, the Commander-in-Chief, Coast of Ireland.

There were the light cruiser *Adventure,* Captain Hyde; a number of mystery ships which came and went in the manner their secret duties required; and the sloops, in reality gunboats, specially built during the war. These latter vessels carried the gentle sounding names of the flowers, such as *Buttercup, Snowdrop, Zinnia,* etc. Then there were the legion of smaller craft, the trawlers, drifters, mine sweepers, salvage tugs, and M. P. boats. Nor were these vessels the only ones that belonged to the Queenstown command. There were sweepers and trawlers at Berehaven which were later augmented by submarines transferred from Killybegs farther north. The *Vulcan,* mother ship, accompanied her charges to this new base. This submarine unit was commanded by the famous Captain Nasmith, who did such remarkable work with the submarines at the Bosphorus. Farther north, at Buncrana, there were destroyers and sloops in addition

[1] Commenced in issue of December, 1922.

to trawlers and mine sweepers, these latter being found *everywhere* that shipping went along the coast.

As the American destroyers increased in numbers, the British destroyers which had operated from Queenstown were gradually withdrawn to other fields. The largest British destroyer base which worked the convoys, more or less in conjunction with the Queenstown destroyers, was at Plymouth on the English Channel. This was a separate command.

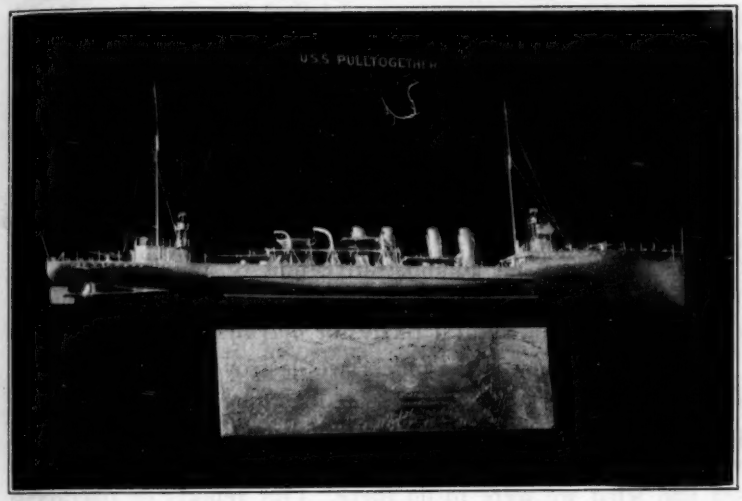


THREE U. S. DESTROYERS AT ONE OF THE QUEENSTOWN BUOYS
This shows the usual method of mooring

During the time of the patrol the destroyers used to come into Queenstown only at the end of every second tour. For the rest period, after the other tour, we went to Berehaven. This was to avoid congestion in Queenstown harbor where there was none too much room for so large a number of vessels. The *Melville* remained at Queenstown to take care of the destroyer wants at this place, and the *Dixie* was sent to Berehaven for the same purpose. As Captain Pringle was senior to Captain Price, these of-

ficers changed commands, it being the desire of Admiral Sims that the senior be always at Queenstown on the *Melville*.

After the convoy system was in full working order, the plan of alternating between Queenstown and Berehaven as rest places for the destroyers was abandoned; and Queenstown only was used for this purpose. This was for the simplification of administration, and because the outbound convoys started from Queens-



SILVER MODEL OF A U. S. DESTROYER

Presented to Admiral Sir Lewis Bayly, R. N., by the captains of the *Melville*, *Dixie* and thirty-five destroyers

Inscription

To

Sir Lewis Bayly, K. C. B., R. N., Commander-in-Chief, Coast of Ireland. Presented by officers in command of ships of the United States Navy who served under his orders during the struggle to preserve the freedom of the seas and to make the world safe for democracy.

town or from ports farther eastward. The *Dixie* returned to Queenstown and moored close to the *Melville* just above the Haulbowline dockyard. A large number of additional buoys were planted, extending up the harbor to beyond Monkstown, and down the harbor nearly to the Bar Rock buoy. During the patrol it was possible to assign the duties of the ships so that only a few were in port at the same time; but this could not always be done

when three or more convoys were being looked out for simultaneously. Under these conditions the harbor would frequently be practically abandoned of destroyers, and then again at times there might be as many as twelve or eighteen in port together.

The Queenstown destroyers were officially known as the United States Destroyer Squadrons Operating in European Waters. The Commander of this force was Rear Admiral Sims, who also commanded *all* the other United States Naval Forces in Europe. My first orders were to report to Admiral Sims, and from him I received the original operation order under which we carried on. Captain Pringle who commanded the *Melville* was Admiral Sims' Chief of Staff for the destroyers. He was also officially on the staff of Vice Admiral Bayly. He thus held an unusual and unique position, made necessary by the fact that Admiral Sims' extensive command kept him away from Queenstown the greater part of the time, and that, while the American destroyers at Queenstown were an administrative unit of the United States Forces in European Waters, they were, at the same time, under the orders of Vice Admiral Bayly for *operative purposes*.

Captain Pringle was the officer we destroyer captains went to for everything pertaining to upkeep, maintenance, personnel, supply, discipline, in fact everything administrative. Admiral Bayly was the one we went to for orders as to when we would go to sea and what we were to do there. Our reports of operations were made to Admiral Sims, through Captain Pringle, his Chief of Staff. Copies of these reports were sent to Admiral Bayly. It all worked out beautifully, and was a most perfect example of efficient co-operation, much of the credit for which belongs to Captain Pringle for his executive ability and unusual tact.

In disciplinary matters which concerned the personnel of both the British and American Forces, rather an unusual situation occurred. The first incident was a collision between the British sloop *Laburnum* and the American destroyer *Jarvis*. In order to place the responsibility in such cases Admiral Bayly decided he would order Courts of Inquiry under the British regulations; but the court in each case was to be composed of both British and American officers. The British Court of Inquiry corresponds to our Board of Investigation, there being three members, and no oaths taken unless specifically required in the precept.

In this first court, I was the American member, the British members being the flag captain, Captain Carpendale, and Commander Cochrane of the sloop *Myosotis*. Copies of the proceedings were sent to both the British and American Commanders, and each then decided what disciplinary action should be taken only insofar as the personnel of his own service was concerned. The court just referred to was, so far as known, the first time in history that British and American officers sat together on such a tribunal. There were quite a number of such mixed courts before the war ended.

TRANSITION FROM PATROL TO CONVOY

While the operations of the United States destroyers resulted in a decrease in sinkings, there were still far too many of these latter to warrant an optimistic viewpoint as to the final outcome. There had been, for a long time, a struggle for the upper hand between those in favor of the adoption of the convoy and those opposed to it. The reasons for and against have been given many times and will not be reproduced here. Finally the convoy advocates succeeded in persuading the Admiralty to try a few experimental ones. These proved successful, and from that time on the transition gradually took place, the destroyers being withdrawn from patrol duty as their services as escort vessels were required.

It took some little time to get the convoy system properly organized. For a while the destroyers would travel light one way. That is, we would take a convoy to sea, and come back to port without one; or would go to sea without a convoy and bring one back. This of course was an uneconomical employment of the destroyers; so as soon as the number of convoys increased sufficiently, and the organization and administration of their operations straightened out, the outbound convoys were so timed in departure that the destroyer escorts would proceed with them to the limit of the submarine danger zone, and then join company with an inbound convoy. By this method all the destroyers worked both ways.

The outbound convoys would be collected at Milford Haven or Queenstown, or sometimes they would be started from Liverpool, the escort meeting them somewhere in the Irish Sea. The kind of escort furnished depended on the character of the con-

voy and the vessels available. Sometimes the escort was composed of destroyers only, sometimes they would be mixed, destroyers and sloops, destroyers and trawlers, etc. On occasions when destroyers, sloops and trawlers ran out, the newer *P* boats were impressed in service. Quite frequently a mystery ship was used as one of our escort squadron, it being stationed, for decoy purposes, some distance from the convoy.

These early convoys made a great difference in the work and responsibilities of the senior destroyer captains, who, by virtue of their seniority became the escort commanders. While on patrol we had only our own ships to look out for unless we happened to be in company with a single merchant ship. But when the convoy started we immediately became division or squadron commanders with the tactical duties involved, and the responsibility not only of the escort vessels but, to some extent, of the convoyed vessels as well.

There was also some administrative work and paper work involved which had not been on our shoulders previously. For example when we received the operation order from headquarters the escort commander would, usually, on the morning of sailing, have a conference at Admiralty House with the masters of the vessels that composed the convoy. Here the plan of procedure was explained, instructions given as to methods to be followed under different circumstances, admonition to keep closed up, lights out at night, etc. These merchant captains had never before traveled in formation. They were now to be initiated under peculiarly trying conditions where they must not only keep position accurately, but by day they must zigzag, and by night they must keep their lights out. Many of them did not like the idea at all, some few bucked it, but the greater number came around in good shape and did their best to make the convoy system the success which it eventually proved to be. Before sailing each time, the escort commander had to issue an operation order to his force, and on return to port he was required to submit a report on the operations. Neither of these had been required while the patrol was in effect.

In the development of the convoys it was necessary in each case to give much detailed instruction which later became doctrine and could then be omitted in individual cases. However, there

was always much information to be imparted to all concerned. Let us follow through the mode of procedure in one such instance.

The escort commander would receive an operation order from the commander-in-chief. This gave the information concerning the convoy, its makeup, etc., the composition of the escort, and the time of departure. It was accompanied by the copies of all orders issued to the individual ships composing the convoy. These orders were:

(a) Sailing orders.
(b) A sketch showing the position of all vessels in convoy.
(c) A sketch of the zigzag plan to be followed.

The sailing orders were complete as to detail in regard to: (1) time of getting under way; (2) order in which ships should pass out through the boom; (3) directions for passing through the swept channel; (4) the courses to be steered with positions to be passed through by the convoy so long as it remained together; (5) what to do in case escort leaves before dispersing position is reached; (6) the speed of the convoy; (7) the zigzag to be used, and for how long.

In addition the escort commander was given an envelope marked "secret," which contained the information, orders, and instructions concerning the inbound convoy which was to be met after the parting of company with the outbound one. These instructions were often quite bulky as they usually contained orders for the ocean escort commander and the commodore of the convoy. When a convoy left the United States, Halifax, Dakar, or wherever its starting point was, the destination of the different ships was not always known; or if they had been given a destination, this was changed after departure without their knowledge. This information had to be conveyed to the commander of the convoy so that the vessels could be rearranged in formation to facilitate the separation of the convoy into groups bound for English West-coast ports, Channel ports, or French ports.

There was also furnished the escort commander information of all convoys at sea or which would be at sea during the time he would be out. This was so as to avoid crossing one another

at night. When two convoys met or crossed on a dark night it created an ugly situation which no one cared to encounter.

A TYPICAL MERCHANT CONVOY

Having received the orders from the commander-in-chief, the escort commander would arrange for the aforementioned meeting with all the merchant captains at Admiralty House. There would then be a conference of the captains of the escort vessels on board that of the senior escort commander, after which the latter would issue an operation order to his force.

A sample of one of these operation orders is reproduced here:

1118. U. S. S. *Wadsworth.*
7 October, 1917.

Memorandum Order.

From: Commanding Officer, U. S. S. *Wadsworth.* (Escort Commander)

To: Commanding Officers

U. S. S. *Wadsworth*	U. S. S. *Walke*	U. S. S. *Trippe*
U. S. S. *Tucker*	U. S. S. *Allen*	H. M. S. *Crocus*
U. S. S. *Shaw*	U. S. S. *Cummings*	

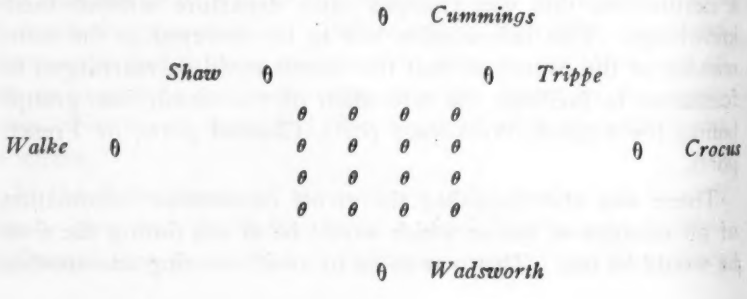
Reference: C-in-C Queenstown No. S. O. 525 of 7 October 1917.

1. *Allen, Tucker* get underway 8 a. m. and proceed to Milford Haven. On completion duty with H. M. S. *Donegal,* request instructions by wireless.

2. *Wadsworth, Shaw, Trippe, Cummings, Walke, Crocus* get underway at 7:15 a. m. On arrival off Daunt Lightship scout to ten miles distance on following approximate courses:

Walke	220°	*Cummings*	160°
Shaw	200°	*Trippe*	140°
Wadsworth	180°	*Crocus*	120°

3. Return to Daunt Lightship by 11 a. m., and when convoy is formed take station as shown below:



4. Make as wide zigzag as practicable to best cover area and protect convoy having consideration for state of sea, visibility, and necessary fuel economy.

5. When outbound convoy is dispersed come within easy signal distance of *Wadsworth* to receive instructions.

6. Stations for incoming convoy will be same as for outgoing convoy. *Allen* and *Tucker* will take station five miles ahead and about 3 points on starboard and port bows respectively, of the convoy. They will close in on convoy if poor visibility makes this desirable.

7. When convoy separates, *Trippe, Walke, Shaw,* and *Crocus* will return to Queenstown. Other destroyers will form screen around two west coast ships as follows:

Allen—ahead,
Cummings—starboard bow to beam,
Tucker—port bow to beam,
Wadsworth—astern.

8. Force answer to call sign X.

9. For outgoing convoy C. B. 585 is in effect (this will be distributed to U. S. destroyers tonight.) For incoming convoy C. S. 04 is still in effect. Attention is called that when C. B. 585 is used all courses signalled are magnetic and when C. B. 04 is used courses signalled are true.

J. K. TAUSSIG.

In the outbound convoy there were sixteen ships. It will be noted that one of the escort vessels was H.M.S. *Crocus,* a British sloop. This frequently happened when there were not sufficient destroyers available.

At the appointed time the destroyers would get underway and stand out to sea. This was usually about two hours in advance of the convoy. The escort would then spread out and make a "sweep" for a distance of ten miles off the lightship. This was to search for submarines and, if there should be any present, to keep them under while the merchant ships were leaving harbor, passing through the swept channel, and forming up afterwards. This latter was usually a slow process owing to the inexperience of the personnel in tactical maneuvers. The escort vessels would return from their scouting in time to join the convoy on its arrival off the lightship. Here would commence a shepherding process where the merchant ships were the sheep and the destroyers the collies. It was something of an effort to round the convoy into shape, but when once done, and we were finally on our way, we settled down to routine zigzagging with only now

and then a break in the formation caused by some ship not keeping position.

In these early merchant convoys the ships in formation were placed at intervals of 1,600 yards and at distances of 400 yards. This gave a comparatively wide front and shallow depth. The destroyers or other escort vessels were stationed ahead and on the flanks, with one astern to keep the ships closed up and to be in position to attack any submarine that might pass through the formation. The speed of these convoys was, of course, determined by that of the slowest ship, which frequently was not over eight knots. Then about one knot in advance was lost through the zigzag, and usually another knot was lost owing to the prevailing westerly sea which knocked down the speed of all ships.

For forty-eight hours or more the convoy would proceed to the westward. Then when reaching the dispersing point, or if the dispersing point had not been reached by dark of the day on which due, the signal would be made for the convoy to separate, and each vessel would be left to its own resources for the remaining trip across the Atlantic. The destroyers would assemble, and the escort commander would set a course and designate a speed to take the force to a daylight position well in advance of the rendezvous for the incoming convoy. A radio would be sent to the ocean escort requesting his time of arrival at the rendezvous. These merchant convoys were usually several hours late and often much more, which necessitated the escort vessels proceeding farther to the westward than originally contemplated.

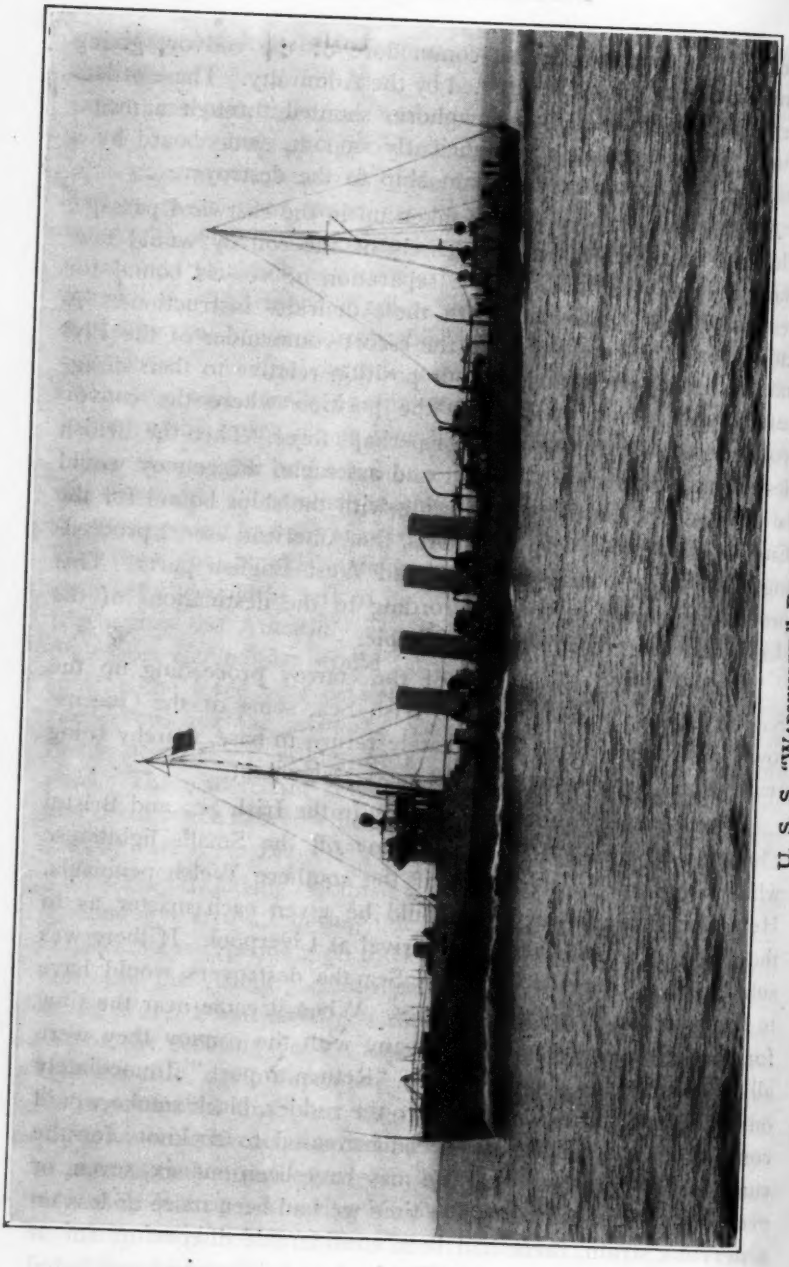
At daylight, having obtained a position well in advance of the on-coming convoy, scouting line would be formed, the distance between ships depending on the known accuracy of our own position, and the visibility conditions. Westward the scouting line would proceed, and usually at the expected time, or a little later, one of the scouting vessels would sight smoke or masts or the hull of a ship, again depending on atmospheric conditions. This destroyer would flash out the code word for "contact." All others knowing his position in line would immediately alter course so as to assemble on the convoy. No further signals were necessary, each destroyer knowing his place and taking it, immediately beginning to patrol at a distance of from 800, to 1,200 yards from the nearest merchant ship. The escort commander would

then communicate with the commodore of the convoy, giving him such orders as were directed by the Admiralty. These orders were either signalled by semaphore, shouted through a megaphone, or, if the sea was sufficiently smooth, sent aboard by a heaving line from the merchant ship to the destroyer.

Another two days would be taken up in the eastward passage. Then re-arrangement of the vessels of the convoy would take place in order to facilitate the separation of vessels bound for destinations in accordance with the Admiralty instructions. A radio would be received from the escort commander of the Plymouth destroyers asking for our position relative to their designated rendezvous, which was the position where the convoy would separate into two parts, or perhaps three. Then the British destroyers would make contact and assemble, the convoy would be divided, the British escort going with the ships bound for the English Channel and French ports, the American escort proceeding with those bound for Irish and West English ports. This procedure varied at times according to the destinations of the ships, and the escort vessels available.

If there were only a few of the convoy proceeding up the Saint George Channel and the Irish Sea, some of the Queenstown destroyers would immediately return to base, thereby being ready that much sooner for the next assignment.

If there was no submarine activity in the Irish Sea and Bristol Channel we would drop our convoy off the Smalls lighthouse which is at the western end of the southern Welsh peninsula. Here the final instructions would be given each master as to the route to be followed until arrival at Liverpool. If there was submarine activity in the Irish Sea the destroyers would have to continue as far as the Skerries. When it came near the time for the destroyers to part company with the convoy they were all on *qui vive* for the radio order, "Return to port." Immediately on its receipt, hard over would go the rudder, black smoke would come from the stacks, and speed increased to 20 knots for the run back to Queenstown. We may have been out six, seven, or even eight days, during which time we had been more or less on a nervous strain, there had been considerable discomfort for at least a part of the time, and the fresh provisions had not lasted



U. S. S. "WADSWORTH," DESTROYER No. 60
Flagship of Commander Taussig

through. The three days' rest before us at Queenstown looked very tempting, and we could not get there too soon.

AT QUEENSTOWN

Everybody who served at Queenstown seems to have a kindly feeling for that place, this in spite of the arduous duties performed by all hands. There was, of course, a reason for this, and the reason was the considerate way in which those of us who were performing strenuous duty at sea were treated during our stay in port. The organization and administration of these Queenstown forces were so complete and perfect as to detail that everything always proceeded like clockwork.

As the destroyer neared the entrance to Queenstown Harbor she would flash, on the searchlight, the private signal for the day and her own distinguishing call. This immediately would be answered by the signal station high up on the hill at the harbor entrance. Before reaching Roche Point a signal to this effect would come: "From C-in-C to *Wadsworth:* Go alongside oil jetty," or "Moor to buoy number 3." Never did we have to wait for instructions, or to ask for them. As soon as we secured there was no question as to what was to be done. Immediately fires were allowed to die out and machinery disabled as necessary. We knew, unless orders were received to the contrary, that we would be in port for three days. Two at a time the destroyers would be refueled until this process was completed. The movement to and from the oil jetty was done by tugs so as not to interfere with our work on the machinery. All hands on all destroyers immediately turned-to to get the ships ready for the next tour of duty. This was done before resting.

Hardly would we be tied up when the repair officers from *Melville* or *Dixie*—whichever ship was mothering us—would come on board. There were Lieutenant Commanders Church, Dunn, Laird and Campbell, or their representatives, always on hand to find out what was wanted, and we always wanted something. The crews of the *Melville* and *Dixie* were busy night and day on the continuous duty of keeping these thirty-five destroyers in operative condition. Each destroyer was averaging over 6,000 miles running every month, and this in all kinds of weather and under trying conditions. By the middle of November,

U. S. S. "WADSWORTH," DESTROYER No. 60
Flagship of Commander Taussig

1917, my own ship, the *Wadsworth,* had in its two years of commissioned life steamed 73,000 miles. We were no exception to the hard service seen by all. It is simply mentioned here to show why it should be expected that the *Melville* and *Dixie* were kept busy. And they never failed to complete their work on time.

Either on the day of arrival, or, on one of the following days before departure, the signal force would bring aft a message of this import: "From Admiral to Captain: If you have nothing better to do would you like to come to dinner at seven thirty tonight?" or, "Will you come and have tea with the niece and me this afternoon?" To which there was always sent back the same reply: "From Captain to Admiral: W.M.P.," which we had learned was the British Navy way of saying, "I accept with much pleasure."

The officers, of course, found their own means of amusement during stays in port. There was one general meeting place for all, the Royal Cork Yacht Club. Here the clans usually foregathered before proceeding on their devious ways; and here again they met before catching their boats back to their respective ships. Pleasant walks in the country were always available. There was tennis for those who liked tennis, and golf for those who liked that form of sport. For those who cared for society there were lots of charming people to meet who were always more than cordial to the American officers. Now and then there were informal dances. One part of the Admiralty grounds known as the "Sloop Garden," had been set aside by Admiral Bayly for the use of the Commanding Officers of the British sloops, and the families of such that happened to be at Queenstown. These courtesies were extended to the captains of the American destroyers. Here was a good tennis court in the midst of shade trees and lovely flowers which we were allowed to pick at will. And here the ladies, led by Mrs. Douglas, the charming American wife of Lieutenant Commander Douglas of the British Navy, dispensed tea during the afternoon sessions of tennis.

For the men, recreation was more difficult to find. This especially after Cork was placed out of bounds. There were nice attractive girls a plenty for the young men whose tastes inclined them that way; and quite a few were married in Queenstown. The amusement center was the Enlisted Men's Club, which was

started by a donation from Americans in London. This club, from a modest beginning, grew to be a large well-managed affair —entirely in the hands of the enlisted men—excepting for such supervision as was desirable by a committee of officers. The club contained everything such a club should have, including a moving picture hall, and a restaurant, where the men could get a better meal at much less cost than was to be had in town. There were also limited sleeping accommodations.

Every Saturday night there was a vaudeville show, the performers of which came from the various American ships, with now and then the British sailors or marines furnishing a turn. On these Saturday night occasions all the officers in port usually attended, the gallery being turned over to them. Admiral Sims always went when he was in Queenstown. Efforts to get Admiral Bayly to attend were unsuccessful. It was rumored that he stated he was not going to attend any festivities until an American destroyer brought in a German submarine. He did attend the Saturday following the *Fanning's* successful coup.

I must not dwell too long on the pleasures of our short stays in port. But there was one pleasure that happened each time to all commanding officers; which pleasure was also a duty. This was the visit to Admiral Sir Lewis Bayly at 10 A. M. on the day following our arrival in port after a tour at sea. It was a standing order that such visit should be made, the time always being the same no matter what hour our ship got in. At ten o'clock the "puff puff" boats would start leaving the destroyers, each carrying its respective commanding officer. At the dock we would gather in twos and threes and walk together up the steep hill to Admiralty House.

Here all of us would meet in the ante-room and wait for the Admiral to announce his readiness to see us. Sometimes there would be only five or six of us, and sometimes as many as fifteen or twenty. Then there was a comparison of experiences and a detail of happenings, with nearly everybody talking at once. Some had lost a ship of their convoy by its being torpedoed; somebody had picked up survivors; others had been through different trying experiences; while still others had found an amusing side to an incident. Whatever it was, each one unburdened himself to whichever of his associates would stop talking long enough

to listen. Then when the messenger stepped in and announced that the Admiral would see us, a hush fell and we passed silently into the Admiral's office.

Sir Lewis was always seated at his desk with one or more official papers at hand. If he happened to be engrossed in something he did not look up immediately; but it was never long before he greeted us with:

"Good morning, gentlemen; please sit down."

Then he would listen to anything any of us had to report, and when finished he would say what he had to say, which usually was not much. Then would come:

"That is all, gentlemen; suppose you step down to the operations office and find out what your next duty will be."

It made no difference to us whether our interviews with the Admiral on these occasions were long or short, we were always glad they took place. We liked the personal interest he showed in our doings, and it often gave us opportunity to mention something that would otherwise never have been spoken or written. We were certainly kept in close personal touch with the Admiral, and it is the personal touch which appeals.

The operations office was in the basement, in what was formerly the billiard room. Now the billiard tables were covered over with boards and on them were spread charts on which were plotted the positions of convoys, submarines, etc. In this office we would be greeted by one of the three duty officers, Commander Herbert, Commander Grubb, or Lieutenant Commander Douglas, all of whom had seen long active service, and were having a spell of shore duty. Commander Grubb had completed three years of strenuous destroyer duty when he came to Queenstown. He was an active, efficient officer, cheerfulness being one of his chief characteristics. He always greeted me with a cheery: "Hello Wadsworth!" in which he pronounced the *a* like the *a* in bad.

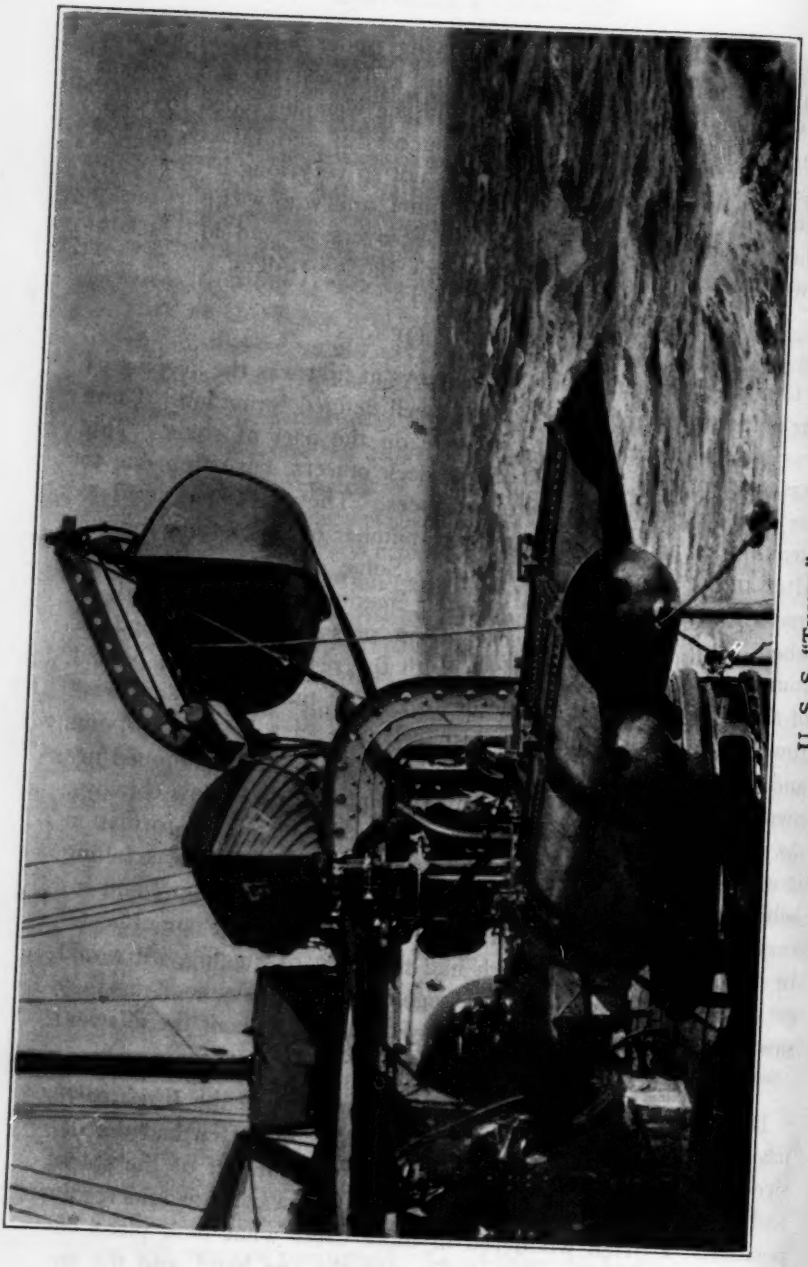
Commander Herbert was a quieter man, but genial and pleasant withal. He was one of the dare-devils of the British service. While a few of us knew it was he, on whose head the Germans had placed a special price on account of the Baralong affair, this was not mentioned. In addition, he had been through several narrow escapes on submarines. Admiral Bayly liked to

have such officers as Herbert serving under him. There was Captain Nasmith with the submarines at Berehaven, and, as soon as Captain Hyde left the *Adventure,* he was succeeded by Captain Gordon Campbell, the most successful and famous of the mystery ship captains. And it was not so very long before Captain E. R. G. R. Evans of *Broke* fame, and who was our liaison officer when the first American destroyers arrived at Queenstown, found himself under Sir Lewis Bayly's orders.

CONVOY EXPERIENCES

Our chief difficulty with the convoys at first was the keeping of the ships together in a reasonably well defined formation. There was always a tendency to straggle on the part of some. This was not entirely the fault of the deck officers, but often due to the fireroom and engine room forces. They were not used to steaming at an absolutely uniform number of revolutions minute after minute, and day after day. Some of the vessels of the convoy were making close to their maximum cruising speed, so when fires were cleaned the steam pressure dropped, and of course the speed was reduced, with the resultant falling behind of the ship concerned. The destroyers, at times, were kept busy rounding up the stragglers. In order to get a better viewpoint and to be in position to prod the laggards I always stationed my own ship, the *Wadsworth,* to cover the rear of these slow convoys. As we patrolled back and forth across the rear of the formation it was a simple matter to hail or signal any ship that was falling behind. The usual message was: "You must close up," and invariably the reply would come back: "We are doing our utmost." In fact on some ships which had the habit of lagging, we would get the reply before our message was sent. As soon as they saw our signalman *start* a message, out would shoot the answer: "We are doing our utmost."

If a ship lagged too far astern, I would have the *Wadsworth* pass between that ship and the convoy. This often had the desired result. The smoke would begin to pour out of the stack, and slowly but surely this "doing our utmost" ship would regain position. I often wondered in those cases what took place between master and engineer officer on the one hand, and the en-



U. S. S. "TUCKER"
Showing torpedoes in tube and method of securing boats at sea

gineer officer and firemen on the other hand. It was probably best illustrated in the old navy song which starts:

Oh, the Captain went below, and . . . etc.

During the early convoys the ships were widely scattered at daylight. The reasons for this were timidity on the part of those officers who were afraid of collision, and partly because the ships carried dimmed side and stern lights. At dark the ships would begin to open out and continue to do so, so long as the lights on the next ship could be seen. And these lights invariably showed farther than was intended. Gradually *all* lights were dispensed with, and it was found that the ships would then keep closed sufficiently to see the hulls of those next aboard. This was perfectly safe, especially after it became common practice not to zigzag during the dark hours.

U. S. S. "TUCKER"
Showing torpedoes in tube and method of securing boats at sea

Communications were a particularly difficult problem at first. Some of the ships carried only one radio operator, and no signalmen who understood the semaphore system. It was usually necessary in such cases to deliver a message by word of mouth through a megaphone. And this was not always easy when the wind was howling and a big sea was running. Often would the reply come back, "I don't hear you," when in reality was meant, "I do not *understand* you." At times there would be French, Italian, or Scandinavian ships sprinkled through the convoy. These often were a problem because sometimes they did not understand the English language. But we found out that while on most of these ships they did not understand *plain* English, they did have a working knowledge of good old English seagoing swear words. Commander Fremont told of his troubles in getting an Italian tramp merchant ship to understand a message. He tried international flag hoist, semaphore, radio, and megaphone; but all to no avail. Finally he ran close aboard and shouted through the megaphone: "You blank blank, blankety blank, when I hoist flag X you head south blank blank quick, savvy?" and without a moment's hesitation came the answer:

"All right, Sir!"

The signaling gradually improved with the placing of trained signalmen on every ship in the convoy, and, although the radio

communication never reached a really satisfactory state, still it worked in emergencies.

However, as time went on the whole conduct of these merchant convoys improved. With the assignment of men-of-war as ocean escorts, and the detail of "commodores" to all convoys, there was a decided advancement in station keeping, signaling, etc. Especially was this evident in certain inbound convoys which had been carefully drilled on the trip across the Atlantic. On one occasion I had charge of an escort of eight destroyers with a convoy of thirty-two merchant ships. The Admiralty considered the escort not of sufficient strength, so eight British destroyers were sent from Plymouth to re-enforce us. At my request the British destroyers took station as an outer screen. One of them sighted a submarine and made the warning signal. Without the least bit of confusion the convoy and escort, a total of 48 ships, turned simultaneously eight points right, and the danger was successfully avoided.

It was my good fortune not to have a ship of any merchant convoy of which I commanded the escort, torpedoed. At times submarines were sighted, but they were kept down without getting in a position for attack. In these early days of the convoy there were strict orders that no escort vessel should leave the formation to hunt submarines. Of course if a submarine was sighted, the nearer destroyers would go after it and keep it under until the convoy was well out of range. But the destroyer would then cease the hunt and rejoin the convoy. Later, when depth charge barrages were in order, this was changed so that if a submarine was located, the destroyer would continue the hunt until all possible chance of getting the sub was gone.

One dark night while the *Wadsworth* was patrolling across the rear of a slow convoy, the officer of the deck, Ensign N. P. Earle, shouted through the speaking tube: "Dropped a depth charge, sir!" Immediately afterwards as I was jumping up the ladder to the bridge the explosion took place, followed shortly by the explosion of the second charge which had also been let go. The officer of the deck had seen what he felt sure was the luminous wake of a submarine running submerged. It passed from our quarter to ahead as if the submarine were going to attack the convoy from the rear. Both depth charges being gone,

we circled looking for results. In a few minutes the radio operator through the speaking tube reported:

"*Trippe* reports striking a submerged object which listed her fifteen degrees." This of course was the submarine whose wake we had seen. Either our charges dropped close enough to shake him up or he was going ahead with his attempted attack when he unexpectedly bumped the *Trippe*. At any rate there was no attack on the convoy. A half hour later the radio operator reported hearing a German submarine fairly close aboard calling excitedly on the radio as if wanting help. Of course we could not decode the message, but were satisfied that this fellow had been sufficiently damaged to be making appeals for help to his next nearest confrère.

The detonations of depth charges near the ships of a convoy always gave them the impression that they were struck by something, and, until they were used to it, would so report to the escort vessels. Once in a while a ship would *think* herself torpedoed; and there were instances of their actually stopping and beginning to abandon ship by lowering boats, when the sole cause of their discomfiture was the explosion of a depth charge probably a half mile or more away.

While there was considerable monotony in the convoy duty, there were many things to keep one interested or uncomfortable. For example, there would be a machinery breakdown,necessitating the taking of the vessel in tow; or a ship would have its cargo shift leaving us to wonder whether or not she would turn turtle. If a ship was torpedoed there was the problem of picking up the survivors, or if the ship remained afloat, the problem of getting her into port. And of course we had a reasonable number of false alarms. I remember one case in particular where the escort destroyers were on a scouting line standing towards our expected inbound convoy. The atmosphere was unusually clear. Suddenly the masthead lookout reported:

"Conning tower of a submarine dead ahead."

We could not see it from the bridge, and shortly afterwards a rain squall in that direction shut out the horizon from view. The lookout was positive he had seen the submarine, so I sent radio to the ocean escort:

"Submarine sighted between the convoy and escort."

THE STERN OF THE U. S. S. "POSTER" "POOPED" BY A FOLLOWING SEA
Note the almost hidden death chaser

Shortly after this the rain squall passed by, and there, showing over the horizon, were the topmasts of the convoy which had for its ocean escort the auxiliary cruiser *Moldavia*. This was a large merchant ship with two smokestacks, and it dawned on me at once that what the lookout had mistaken for the conning tower of a submarine were the two smokestacks, almost in line, over the horizon. So I sent radio to the *Moldavia:*

"False alarm, lookout mistook smokestacks for conning tower."

The Commodore was evidently not pleased with the scare we had given him, and when we ran close aboard to deliver orders he shouted in a sarcastic tone:

"I congratulate you on your fine lookout."

Which remark I ignored by answering:

"I have the following orders for you from the Admiralty," and went ahead and gave him the orders.

We had our navigational difficulties. When proceeding to meet a convoy, it was necessary of course, that our position be accurately known at all times. This was difficult in view of the large proportion of cloudy and foggy weather which prevailed in those waters. Fortunately these poor visibility conditions did not often last long at a time. But there were occasions when twenty-four to forty-eight hours would pass by without getting a sight. When we once joined company with the convoy our navigational responsibilities ended, until we again separated. The Commodore of the convoy was responsible for its safe navigation. However, there were instances where the Commodore would call on the escort commander for his position.

An illustration of this happened when on one occasion we were presumably nearing the Smalls with a convoy composed of ships for Liverpool and for Bristol. There being no submarine activity in the Irish Sea, the convoy was to disperse at the Smalls. But we had been proceeding on dead reckoning for thirty-six hours, and the chances of sighting the lighthouse were slim indeed. The Commodore of the convoy signaled the *Wadsworth* requesting my position. So I directed all destroyers to take soundings and report their estimated positions. Taking the mean of all these as being as accurate as possible under the conditions, the result was sent to the Commodore. I also signaled, suggesting a change in course. The Commodore did not agree with the posi-

THE STERN OF THE U. S. S. "PORTER" "POOPED" BY A FOLLOWING SEA
Note the almost hidden depth charges

Navy Official Photograph

AT SEA IN ROUGH WEATHER

Note use of life line: this strap-hanging method was employed by some of the destroyers to good advantage

tion sent nor the suggested change, and so signaled. There was then nothing left for me to do but to remind him that *he* was responsible for the safe navigation of the convoy. While this interchange of signals was going on, we received a message from one of the Bristol ships. It was: "Please do not abandon us until we are able to ascertain our position." However, this appeal had to be ignored as so long as the lead was resorted to no ship should get into trouble. When I guessed we were off the Smalls, signal was made to the destroyers to return to Queenstown.

Under these conditions it was not so easy to find the Daunt lightship. Ordinarily navigation off the Irish coast is simple because the water is deep close to the headlands, and on these headlands are excellent sound signals. But on account of mines we were directed to keep at least five miles off all headlands. And in the Saint George Channel there were the same wind conditions that are found elsewhere in the foggy districts. That is, the on shore wind brought the fog, so that ships approaching the land were to windward of the sound signals which could not penetrate to a distance of five miles seaward.

When it was foggy, which was frequent, the destroyers would feel their way in as best they could. Sometimes we would pick up the gun signal on Ballycottin to the eastward, or the double gun on Old Kinsale to the westward. At times there were dead angles in these sound signals, and destroyers would run by the Daunt lightship fairly close aboard without hearing it, winding up dangerously close to the beach in Kinsale Harbor or some other place. On one occasion the *Wadsworth*, in a thick fog ran close aboard the Daunt lightship without hearing the fog signal. The red light on the mast gave the first intimation of our proximity to it. But once we were on our way for Queenstown we kept going until the "hole in the wall" was found.

As the fall progressed and winter approached the weather got worse and worse. That is, the percentage of strong winds, rough seas, and thick weather increased. My own personal experiences ended in the middle of November when I was detached from the *Wadsworth* and ordered home to command a new destroyer. But to show what the conditions were, and what the coming winter had in store for those who were destined to remain, it may be well to state my own experience during the last month of my stay.

Navy Official Photograph
Note use of life line; this strap-hanging method was employed by some of the destroyers to good advantage
AT SEA IN ROUGH WEATHER

During these thirty days the *Wadsworth* made three escort trips, each time taking out a convoy and bringing one back. The times required to complete these trips were eight days, seven days, and seven days respectively. Thus out of thirty days we were twenty-two at sea, and on eighteen of these days it was too rough to spread our mess tables.

During November the Queenstown forces began to be augmented by the addition of new destroyers. Prior to my departure for the United States, the *Duncan,* Commander Roger Williams, arrived, and as the *Bridge,* Commander Riddle, sailed out of the harbor on November 17, 1917, we passed the *Balch,* Commander W. S. Miller, and the *Downes,* Commander Allen Buchanan, standing in for the first time. From then on the force gradually increased in size until about June 1, 1918. Then Brest was made into a United States destroyer base, and the destroyers were approximately equally divided between these two places.

The thirty-five destroyers which operated out from Queenstown during the patrol period and the time of the early convoys, were a part of the old flotilla which had grown up under tutelage of the present Admirals Eberle, Sims, and Gleaves. Their personnel —officers and men—were well drilled and seasoned veterans. Our officer strength had been increased by the addition of that unusually fine body of young naval reserve officers who had volunteered their services, and who were the first to complete the strenuous three months' course at the Naval Academy. But now came the time to break up these excellent crews. There were a hundred or more new destroyers nearing completion. The Bureau of Navigation had no trained personnel to place on board them, so a cablegram was sent to Admiral Sims asking if he could help the Department out. Admiral Sims happened to be in Queenstown on the day this cablegram arrived. There were seven destroyers in port, and the seven commanding officers were organized into a board to make recommendations. We met in Captain Pringle's cabin at nine in the morning and sat continuously until five that evening, when the report was completed. The recommendations briefly summarized were: (1) that the Department should immediately begin sending to Queenstown a definite number of more or less inexperienced officers and men for distribution by the Commander of the Destroyer Force; (2) that

for each new destroyer to be placed in commission the Queenstown force would send to the United States a nucleus crew made up of an experienced commanding officer, one other experienced officer, and twenty-five experienced petty officers, seamen, and firemen.

The recommendations were approved, and the middle of November saw the beginning of the gradual disintegration of the destroyer crews when the *Bridge* sailed for home, having on board Commanders Johnson, Vernou, and myself, three junior officers, and seventy-five men, as the nucleus crews for three new destroyers. It was sad that this had to be done, but it was the only thing that could be done under the circumstances.

This method of organizing nucleus crews for new destroyers continued until the Armistice was signed a year later. The result was that when these first thirty-five destroyers to operate abroad finally sailed for home, there was hardly an officer and man left on them who had been in the original crews. But the greater part of them had returned to the War Zone and were operating out of Queenstown, Brest, or Gibraltar, on the new destroyers.

But there was a good side to this necessary turn-over in personnel. It gave just that many more officers and men the opportunity to operate from Queenstown as a base, and thereby see, as an object lesson for the future, as fine an example of sound organization, efficient administration, and excellent high command, as has ever existed anywhere.

From the uncertainty which at first prevailed as to the outcome of this experiment in co-operation between the naval forces of the two nations, there had developed a feeling of confidence which was well expressed by Admiral Bayly's order to all the ships of the station issued in September, a little more than four months after the arrival of the first destroyers. This order follows:

Admiral's Office, Queenstown,

No. W. 102-A.

11th September, 1917.

MEMORANDUM.

The Commander-in-chief wishes to congratulate Commanding Officers on the ability, quickness of decision and willingness which they have shown in their duties of attacking submarines and protecting trade. These duties have been new to all and have had to be learned from the beginning and the greatest credit is due for the results.

2. The winter is approaching with storms and thick weather; the enemy shows an intention to strike harder and more often; but I feel perfect confidence in those who are working with me that we shall wear him down, and utterly defeat him in the face of all difficulties. It has been an asset of the greatest value that the two navies have worked together with such perfect confidence in each other and with that friendship which mutual respect alone can produce.

LEWIS BAYLY,
Vice Admiral,
Commander-in-Chief.

The Commanding Officers,
U. S. Ships *Melville* and *Dixie;*
H. M. S. *Adventure;*
and all U. S. Destroyers and H. M. Sloops
based on Queenstown.

(To be concluded)

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

WILL HISTORY REPEAT ITSELF?

By Major Edwin N. McClellan, U. S. M. C.

The old Biblical maxim that, "there is no new thing under the sun," is illustrated by the present efforts through proposed legislation to combine the Navy and War Departments into one Department of Defense.

The American Revolution was fought and won by an Army and a Navy administered by Congress through two separate Departments. The Navy and the Marines were practically disbanded at the close of the Revolution. Toward the close of the Revolutionary struggle—after the Naval Committee, Marine Committee, and Board of Admiralty had in turn administered naval affairs—Congress, on February 7, 1781, resolved to have a "Secretary of Marine" and prescribed his duties. Major General Alexander McDougall was selected to fill this newly-created office but the conditional acceptance of that officer was refused by Congress and the office was never filled. Naval affairs were then administered in turn by the Board of Admiralty, the Superintendent of Finance, and the Agent of Marine. Robert Morris filled the latter office until November 1, 1784, after which date the office remained vacant. The Board of Treasury, aided by the Commissioner for Settling the Marine Accounts, and by the Secretary to the Agent of Marine, wound up the business of the Navy of the Revolution. By 1785, the last ships of the Continental Navy had been disposed of. While the Articles of Confederation authorized the building and equipping of a Navy, no effort was made to take advantage of that provision at any time after 1785.

On January 27, 1785, Congress prescribed and outlined the duties of the Secretary at War, but no reference was made to naval matters.

Upon the adoption of the Constitution in 1789, Congress in April of that year, established an Executive Department, known as the Department of War. This was the Department of Defense because it administered all affairs relative to Navy and Army matters. The Secretary for the Department of War, among other things, conducted all affairs relative to "naval forces, ships" and all such other matter respecting "naval affairs, as the President of the United States shall assign to the said department." Thus, the administration of those affairs, which at the present time are conducted by the Secretary of the Navy, were administered by the Secretary for the Department of War. He acted in the dual capacity of Secretary for the Army and Secretary for the Navy. Since the Navy and the Army are the two principal arms by which war is conducted it was quite natural that they should be placed under a *War* Department; but when the Navy was taken out of the Department of War in 1798, the name of that department should have been changed to a name less inclusive—such as the Department of the Army, or some other appropriate title.

This Department of War conducted all the national defense affairs from 1789 until the summer of 1798. During this period several matters of importance with regard to the use of an Army and a Navy as instruments of national defense arose. There were: Shay's Rebellion, the Whisky Rebellion, Indian troubles, etc., at home; trouble with the Barbary Powers in the Mediterranean; possible trouble with Great Britain; and decided friction with France. Our two quasi-rebellions and other domestic troubles of this nature were easily quelled; a treaty with Morrocco in 1787 removed causes of war; hostilities with the Algerines were obviated by the famous Bribe-Treaty of 1795; the Jay Treaty of 1796 smoothed out temporarily our British troubles; a "no tribute" treaty with Tripoli became effective in 1797; peace with Tunis was assured by the Treaty of 1797-99; but the friction with France eventually ended in a naval war with that country and caused the division of the War Department into two separate executive departments—one to administer affairs of the Army and the other those of the Navy.

After vainly struggling with these various problems for nearly ten years, the serious difficulties with France brought Congress

to contemplate the inadequacy of the Departmental machinery to administer properly national defense matters. Of course it was a more or less simple thing for the Department of War—or as it now may be called, the Department of Defense—to conduct both Navy and Army affairs when they were insignificant in importance and no war-clouds were on the horizon; but when war seemed imminent, a reorganization became imperative.

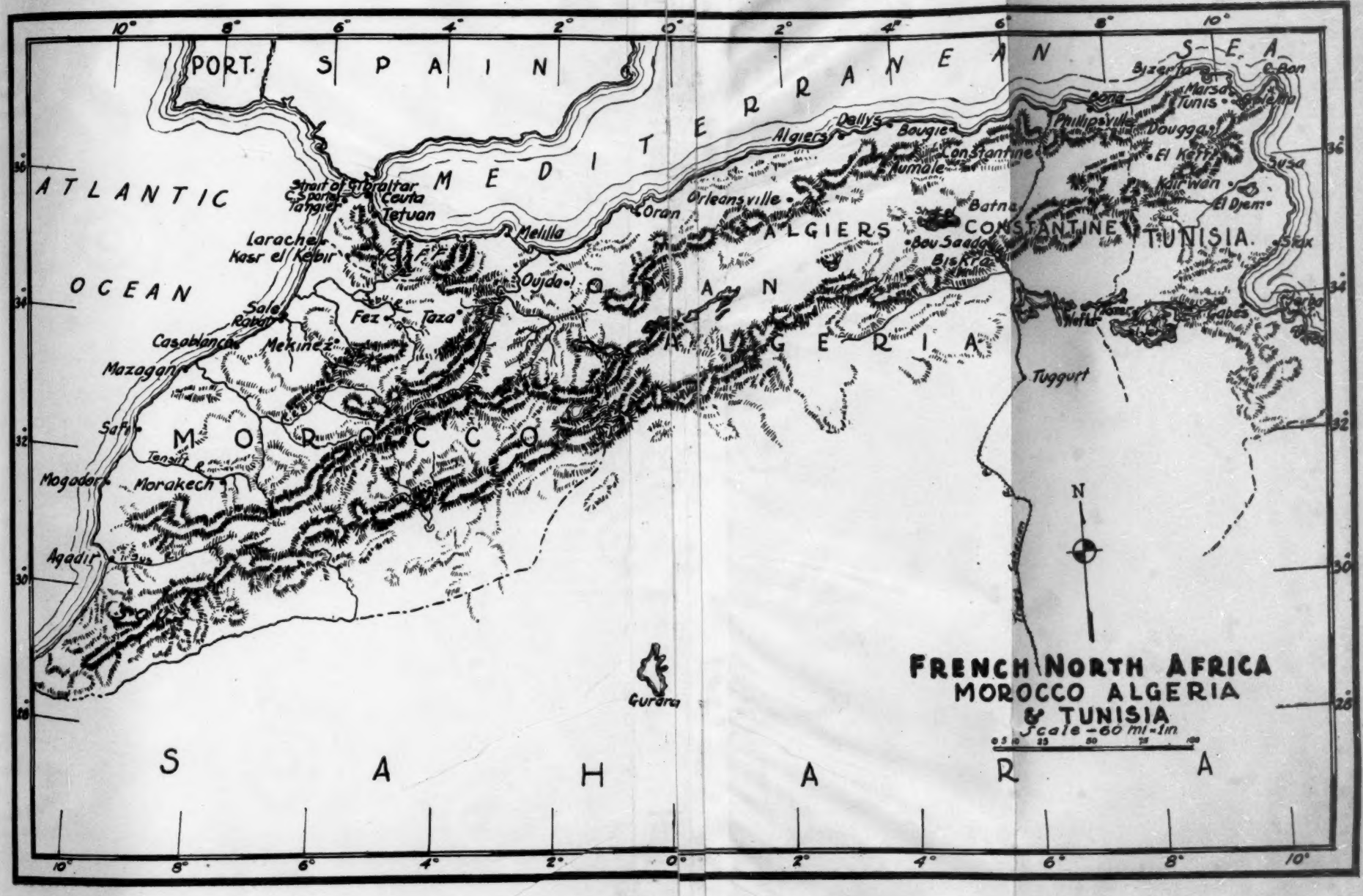
Having successfully experimented with separate departments during the Revolution, Congress placed all national defense matters under one Department in 1789, as has been described. The real reason for this change was a desire for economy. War seemed far off—even beyond the possibility of ever happening again. The spirit of the times was that of liberty, equality and fraternity. The American and French Revolutions had been expressions of these ideals. The sentiment in Congress, reflecting that of the people, was to eliminate, or at least reduce to a minimum, everything military. Many believed it would be better to bribe pirates than to fight them—if it were cheaper to do so. Therefore, it would be neither economical nor necessary to have more than one department to handle national defense matters. But when hostilities with the French became a probability a more practical spirit expressed itself in Congress.

Now here is what happened and how it happened. On March 8, 1798, Mr. Sewall's Committee of the House reported to Congress that a better economy might be introduced into the Department of War by establishing in that Department some officer who should be employed in the immediate superintendence of the naval concerns of the United States. This conclusion of the committee was followed by a recommendation that there be established in the Department of War, a Commissioner of Marine who should have charge of all naval matters intrusted to him according to law. If adopted, this recommendation would result in one super-executive department with at least two sub-divisions—Army and Navy—with a probability of more when conditions called for them.

After mature and serious consideration of this suggested plan, Congress emphatically refused to adopt it, and on April 30, 1798, established the present Navy Department. In thus separating the Navy and Army, Congress, of course, should have prescribed

that the department administering the affairs of the Army be denominated the "Department of the Army" or some other proper title, rather than to have left it with the ambiguous title of the "War Department."

And so, through trial and corrected error, Congress finally concluded that the best plan was to have separate executive departments to administer the affairs of the Army and the Navy. It had tried and abandoned the method of having all matters relating to war or national defense—whether on land or sea—conducted by one department. It had considered and rejected the suggestion that naval affairs be conducted by a Commissioner of Marine acting under the Secretary of War. The question now is—will history repeat itself?


PORT.
S P A I N
M E D I T E R R A N E A N S E A
ATLANTIC OCEAN
Strait of Gibraltar
C. Spartel
Tangier
Ceuta
Tetuan
Larache
Kasr el Kebir
Fez
Sale
Rabat
Casablanca
Mekinez
Mazagan
Safi
Tensift R.
Mogador
Morakech
Agadir
M O R O C C O
Melilla
Oran
Algiers
Dellys
Bougie
Orleansville
Aumale
Constantine
Batna
Bou Saada
Biskra
Oujda
A L G E R I A
ALGIERS
CONSTANTINE
TUNISIA.
Bizerta
Tunis
Bone
Marsa
Philippeville
Dougga
El Kef
Kairwan
Sousa
El Djem
Sfax
Gabes
Tuggurt
Gurara
N
FRENCH NORTH AFRICA
MOROCCO ALGERIA
& TUNISIA
Scale - 60 mi - 1in
S A H A R A
10° 8° 6° 4° 2° 0° 2° 4° 6° 8° 10°
36° 34° 32° 30° 28° 26°

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

LETTERS OF A RETIRED REAR ADMIRAL TO HIS SON IN THE NAVY

By Rear Admiral A. P. Niblack, U. S. Navy

Letter No. 11

FRENCH MOROCCO, THE COLONIAL MIRACLE

Hope Farm,
Long Island, N. Y.,
Dec. 1st, 1922.

Dear Son:

I am very glad that you are benefiting by the Department's policy of sending destroyers abroad for their shaking down cruise. It helps to make good on the enlistment posters and enables officers and men to get their "plimsol mark" sewed on for "full load" for both fresh and salt water. The Navy had a chance to try prohibition in 1914 before the public did, but the country that has been hardest hit by prohibition has been France, as the wine industry in France and her colonies has suffered a hard blow at the hands of Mr. Volstead and Mr. High-Cost-of-Living.

I was more than pleased to get your letter from Casablanca and to know that your commanding officer had taken you with him on his official visits. I have a real and abiding interest in French Morocco. Some years ago I met an American dentist who, when just out of college, with a bunch of instruments in one hand and his future in the other, took the contract to fix the teeth of the Sultan of Morocco at Fez. He landed at Tangier through the surf, and, after some delay, joined a caravan that took seven days to Fez. The camel made him seasick and every night, in camp, he expected to be attacked by bandits. Arriving at Fez, he crawled in on his hands and knees to meet the Sultan

and, in the subsequent proceedings, between a desire to please and a fear of causing pain, he managed to escape imprisonment and got a fee that made him feel like a war-time plumber. Some time later when I told this dentist that I had motored from Tangier to Fez in twelve hours, he was as much interested as he was in what I told him of the miracle which the French have wrought in the country itself. As Colonel, then General, and now Marshal of France the great Lyautey has given to the world an example of colonial development and administration such as it has not yet seen elsewhere. It is such a marvelous thing that the only question is can any successor keep it going along the same lines?

I was particularly glad that you went to Rabat with your Captain and met this great man and his charming wife. He himself says that he is but an humble pupil of the late General Gallieni, with whom he served in Madagascar and Cambodia. His conquest of Morocco, in our own day, reads like a romance but also sheds side lights on the methods by which countries, inhabited by backward peoples, have been exploited by the more civilized nations.

Algeria became French in 1830, and, on the 3d of June, 1883, France assumed a protectorate over Tunisia, much to the discomfiture of Great Britain and Italy. The boundary line between Algeria and Morocco, while geographically delimited, was effective through the raiding of Algeria by wild tribes of Berbers across the boundary from Morocco. About this time Delcassé had begun secretly to intrigue for the possession of Morocco, and Colonel Lyautey, then a cavalry officer in Western Algeria, came into the spotlight in 1903 by entering Morocco at the head of French troops and occupying a number of important posts in Eastern Morocco, such as Talzaza, Martarka, and Berguent. England, Italy and Spain were quite restless under this invasion and advance, and, as a result of diplomatic protests and representations, various treaties were entered into with regard to Morocco, which I told you about recently; one between England and France on April 8, 1904; and one between England and Spain on October 3, 1904. There was also, on September 1, 1905, a treaty signed between France and Spain which contained secret clauses with regard to Morocco. Germany was quite restless

under the growing colonial power of France and particularly under this advance of General Lyautey. Germany desired to be consulted and the theatrical visit of Emperor William the Second of Germany to Tangier in April, 1905, led up to the Algeciras Conference, signed on April 7, 1906, which seemed to internationalize Morocco and establish all countries on an equal footing (except that the secret clauses in the three treaties alluded to were not known by non-participants). This may be said to close the first step in the French acquisition of Morocco.

Germany began to intrigue politically in Morocco through her consuls and commercial agents and managed to stir up sufficient bad feeling in Marakech, the old Moorish capital, to lead to the assassination of the French Doctor Mauchamp on March 19, 1907. Fortuitously this started France on its second step in Morocco. As a protest General Lyautey occupied Oujda, in Eastern Morocco, on July 31, 1907. Owing to German intrigues at Casablanca and subsequent rioting, eight European laborers were killed. These laborers were engaged in harbor work under a concession which the French had secured from the Sultan. As five of the laborers also fortuitously were Frenchmen, the French cruiser *Galilee,* on August 5, bombarded the town and landed her battalion. On August 7th General Drude landed with 3,000 French troops, General Lyautey meanwhile operating in Eastern Morocco, secured the submission of 30,000 Berbers in that region. French troops, landed at Casablanca, completed the occupation of the district surrounding Casablanca known as Chauouiaa and General Lyautey was sent on a military mission to the Sultan. Immediate pressure from Germany prevented further expansion at this time, and this may be said to have ended the second step of the French advance in Morocco.

It is a curious fact that, owing to the Madrid Convention and the Algeciras Conference, the Sultans of Morocco had each, in turn, done away with their armies because they were protected by international agreements and jealousies. What troops they had were only for use against wild tribes, and thus the Sultans were ill prepared to resent either European aggression or domestic revolts. Pacifism is usually an invitation to get kicked. In 1911 the Sultan Abdul-Aziz, that charming gentleman now in exile at Tangier and with whom I have several times dined and

played golf, was besieged in Fez by rebels under his brother Mouley Hafid and both, in turn, called in the French troops from Casablanca to help them. These French troops promptly occupied Rabat, Mekinez and Fez as well as the country surrounding these three important cities. This brought about the famous protest from Germany by the gunboat *Panther* which anchored in Agadir on July 3, 1911, and which nearly brought about a war with Germany. However, on November 4, 1911, both countries signed an agreement by which Germany was given compensations by France in the French Congo and she then consented to a French protectorate over Morocco. This practically tore up the Algeciras Pact as far as Germany was concerned. England, France and Spain figuratively tore it up before it was signed. We alone are still holding the scraps of paper. The ink was barely dry on the Franco-German agreement when *Le Matin*, of Paris, published the secret clauses of the French treaties and German indignation knew no bounds.

As the visit of the German Emperor to Tangier had brought on the Algeciras Conference, so the visit of the *Panther* forced the hand of Great Britain to the extent that it really brought about the Entente, for Great Britain came out flatly against Germany obtaining territorial influence in Morocco, and this backed up the French protest strongly enough to convince Germany that any further intrigue in Morocco was futile. Questions asked in the British Parliament about this time disclosed the fact that Great Britain was prepared to support France, foreshadowing her coming into the war in August, 1914.

On March 30, 1912, the Sultan, Mouley Hafid, signed a treaty accepting the protectorate of the French over Morocco. General Lyautey arrived in Morocco on the 24th of May, 1912, to become French Resident General of Morocco. During his journey to Fez a revolt had occurred in Fez which cost the lives of sixty-eight Europeans, but General Lyautey boldly entered the city. A second revolt occurred the first hour after the arrival of General Lyautey in Fez, who promptly charged Mouley Hafid with being the instigator. The latter abdicated on the 12th of August, 1912, in favor of his brother Mouley Youssef, the present Sultan. The same day a revolution broke out in Marakech when the Pretender (El Hiba) proclaimed himself Sultan, oc-

cupied Marakech and took all Europeans prisoners. General Lyautey and the famous General Mangin drove out El Hiba and thus added another large section of territory to their holdings. In 1913 the French consolidated their gains in territory by active campaigns against the opposing tribes, and early in 1914 pierced through from Taza to Oujda, thereby joining Eastern and Western Morocco. On May 17, 1914, General Lyautey entered Taza at the head of two columns of troops which had been operating separately under General Gournod and General Baumgarten, and which had then made a junction. Active operations were carried on against hostile tribes in the Atlas Mountains and there was continually active fighting on all the borders north, east, and south, when suddenly the World War began in August, 1914.

Morocco as it was at the time of the Madrid Conference in 1880, in which we participated, was later partitioned into three zones. The Spanish zone extended two hundred seven miles on the Mediterranean coast embracing about ten thousand square miles of territory, with a population of about one million. This territory, however, did not include the internationalized city of Tangier, which has a hinterland of one hundred forty square miles. The Spanish zone has always been and still remains a lawless region inhabited by the fierce tribes of the Riffs.

The story of how General Lyautey saved Morocco during the war is a thriller but what I have been telling you must give you a headache. However, if you have a sense of humor, European diplomacy will not make you dizzy. Out of all the intrigues over Morocco, England got rid of France in Egypt and settled all of her outstanding differences with France; Spain got a "red-hot stove" on the Atlantic Coast of Morocco; Italy got a free hand in Tripoli; German intrigue in Morocco failed and she got some prickly heat territory in the French Congo; France got a rich territory almost as large as France, with 6,000,000 inhabitants; and the United States got a lesson, which is probably one of the reasons why we hesitate a bit over entangling alliances and agreements with groups of European Powers. France had experience in Algeria so that in Tunis and Morocco she has established a protectorate instead of a colony, in which she shares her power with the Bey and the Sultan and lets the native offi-

cials rule. General Lyautey has shown admirable tact in all he has done. Everything has been avoided which could wound the religious susceptibilities of the people; the old native arts, almost forgotten, have been revived; and the Mederas, or religious schools, alongside the great mosques, have been restored to their former splendor. Every act and thought has been influenced by a desire to ameliorate the condition of the people and to teach them modern methods of agriculture. Endless roads have been built and hospitals and dispensaries have been opened throughout the more settled regions. General Lyautey himself has been declared to be a "Defender of the Faith." His boundless and untiring energy has exacted from his subordinates a loyalty with nothing of resentment in it. He has done everything to preserve the native cities intact and to compel Europeans to live in separate communities outside the native cities. In every way the French rule has been made tolerant and gentle and the country has been blessed with a security it has never known before.

General Lyautey was in the midst of his great work when the crash came in August, 1914, and ruin stared Morocco in the face. The French Government lost its head and immediately ordered the withdrawal of civilians and troops to the coast towns. General Lyautey protested and then performed a miracle which is one of the epic chapters of history. By his audacity he saved Morocco for France. He had 80,000 regular French troops, of which he promptly sent 40,000 to France, replacing many of the men in the remaining 40,000 by territorials from France who, on account of their age, were considered unsuitable elsewhere. French native units were formed and drafted to France and immense supplies of grain and food stuffs were shipped to the Mother Country. Throughout the War, without relief and without rest, he continued to fight the wild tribes along the borders, north, east and south, which tribes were helped, reinforced and paid by Germany and German agents. The native Chiefs who were most dangerous and who fought longest were Salem, Malek, El Hiba and our old friend, Raisuli. General Lyautey organized, trained and sent to the front in France over 30,000 native troops and furnished endless supplies of grain, meat, horse, mules and military supplies in general. He

found time to organize agriculture; to establish stock and breeding farms; to undertake irrigation works; to construct roads; and to show no signs to the natives that France was in any way anxious about the outcome of the war. Many of the native chiefs in the mountains remained loyal to the French but others were kept supplied with money and arms by German submarines and, through Spain and Spanish Morocco, German agents were able to work undisturbed.

It is a curious fact that it took a great war to awaken the indifferent French people to the value of their colonies, and, at this moment, threatened almost with national bankruptcy, France is still able to pour money into her colonies to consolidate her vast colonial empire, second only to that of Great Britain.

Morocco, out of 36,000 square miles of arable land in the 160,000 square miles controlled by France, has 8,300 square miles under full cultivation, producing wheat, barley, oats, corn, millet, flax and hemp. The vast pasture lands teem with flocks of goats and sheep, and herds of camels, horses, mules and swine. Rich deposits of phosphates have been discovered, oil fields are being developed, and vast veins of iron ores exploited. The railway from Fez to Taza was opened on July 31, 1921, connecting Morocco with Algeria and Tunisia by rail. The Atlantic Coast of Morocco has no harbors, but artificial ones are being constructed at Casablanca, Kenitra, Agadir, and Mogador. At all these coast ports are evidences of the Portuguese occupation about the time of the discovery of America, and yet this was a modern incident in the history of a country whose sultans have reigned since 788 A. D. The Carthaginians overcame the native Berbers in earlier days and were afterwards driven out by the Romans, whose city of Volubilis stands today as well preserved as Pompeii. It was the far flung city of the Roman Empire and was destroyed by the Moors en route to the conquest of Spain. In sight of the ruins of Volubilis, which are near Mekinez, in the interior of Morocco, stands the first Moorish city, Moulay Idris, built on the topmost pinnacles of twin mountain peaks, where the Sultans first established their sway. Today the Sultan is theoretically an absolute monarch but is really limited by having French ministers of foreign affairs and of war, and financially controlled by limitations which have made the Moors a prosperous people.

France has shown that she knows how to share power. She has truly learned what to adopt and what to avoid in colonial administration.

Financially Morocco has its own budget and France only meets the expenses of its troops of occupation. What it has cost her to pacify the country has been all that she has had to pay, and from 1907 to last year the cost of pacification did not exceed 1,100,000,000 francs, the rest of the total of 2,448,840,000 francs has been the cost of garrisoning Morocco, and has been borne by her people. The estimated yearly expenditures now are a half billion francs, of which one-half is borne by France as the cost of garrisoning.

Mr. W. R. Thayer, in his *Life of Theodore Roosevelt,* states that by direct appeal to the German Emperor he persuaded Germany to refrain from an open quarrel with France in 1905, and instead to enter the Conference of Algeciras. Others claim that it was the German Emperor who persuaded President Roosevelt to send delegates to this conference. The fact remains that our treaty rights in Morocco have been as important as those of any other country in the world and we have not yet renounced any of their stipulations. Mr. Roosevelt renounced the "shirt sleeve" policy in favor of "tread softly and carry a big stick." Our present policy is "watchful waiting."

Our Monroe Doctrine is working in the Western Hemisphere and there bids fair to be one some day in Asia, but Africa is now almost entirely parcelled out among the European Powers. We have kindly held the bag.

You asked me in your last letter if I am really in earnest about being a farmer and if farming pays. I want to be a farmer because I have been a consumer all my life and favor the idea of being a producer to even it up, but the principal thing I have been able to raise on the farm so far is a mortgage. That is doing quite as well as most farmers and most governments are able to do these days. I am glad to see there is a farmers' bloc in Congress as it is about time there was less truckling to over-organized labor and more sane relief of the agricultural crisis. I am doing what all governments are now coming to after the "jag" of war, reducing expenses and studying efficiency.

The financial problem France is facing is one of the most in-

teresting in Europe and I will tell you about it sometime. If she is able to put over what she is now trying to do she will remain a first-class power. Civilization owes France a great debt of gratitude and, if there were not so much propaganda going on in the world, we would realize it more fully in this country.

Affectionately,

DAD.

LETTER NO. 12

THE COLONIAL POSSESSIONS AND COLONIAL POLICY OF FRANCE

Hope Farm, Long Island, N. Y.
January 1, 1923.

Dear Son:

A Happy New Year to you! I have just received your interesting letter from Gibraltar enroute to Oran, Algiers, Bizerta, Tunis, Malta, and the Near East. A cruise in the Mediterranean may mean very much or very little, according to what you are interested in. From an amusement point of view it is diverting; from a tourist point of view it is fascinating; from a political point of view it is in a ferment; from a historical point of view it is filled with the ruins of past empires that, in their day, seemed as stable and enduring as our country does now. From a commercial point of view the Mediterranean is the most important waterway in the world which, however, it took the World War to demonstrate, just as, through the inauguration of the convoy system in 1917, Gibraltar suddenly became the greatest port in the world and a base for our own and Allied men-of-war as escorts for the convoys.

You tell me that you saw Mr. Sprague, the American Consul at Gibraltar, who is as much a part of the Rock as the famous "galleries" themselves, for, with his father and grandfather before him they have held the position of American Consul continuously at Gibraltar for over ninety years and I am hoping to attend the one hundredth anniversary. There are no signs now at Gibraltar of the American occupation in 1917-18 when we had forty ships based there. I fear that evil days will fall on the

fortress as modern long range artillery, airplanes and submarines will convert it into an historical museum and a mere port of call —for no land force can now guarantee its security but only the British Fleet.

The Rock was one of the "Pillars of Hercules," Monkey Hill across on the African coast being the other, and between them they marked the boundaries of the known world. The countries bordering on the Mediterranean were the cradle of civilization and its waters have been reddened with the blood of many naval battles fought for empire as Egypt, Phoenecia, Greece and Rome have risen, in turn, to be the center of art, learning and progress, only to finally fall before the Vandal and the Turk. The Turk afterward, for almost two centuries, dominated two-thirds of its entire coastline and, only in our day, has he been despoiled of much that remained of the empire which was greater than that which any other power has been able to hold on its shores. The Turk himself is far from being a vandal except in the newspapers for political, religious and fund-raising propaganda. In our day the French have profited most territorially at the expense of the Turk. France theoretically dominates the Mediterranean but practically Great Britain does.

That is why the French were so disappointed at the Washington Conference as the aspirations of their navy were for a 5-5-3-3 policy with Italy 2 or less. Their delegates, apparently, did not represent the real views of the French people and France on a par with Japan represents more the relative importance and necessity of sea power to the countries concerned. France faces on two seas and has a vast empire less than twenty-four hours across the Mediterranean. While it is true that she is financially unable to maintain a navy in proportion to her desired share, she has been deeply wounded in her national pride by being disrated as a first-class naval power. Moreover, France looks to her colonies for additional man-power to supplement her dwindling military population at home. Local control of the sea is, therefore, essential to her utilization of the man-power and resources of her African empire, and that is why France insisted on submarines at the Washington Conference: to guarantee and guard in time of war her convoys from Africa.

France is proud of her colonial empire second now only to that of Great Britain, but it took the war to really reveal resources to her and she is now beginning to realize that her future salvation lies in her colonies. This is why the President of France, last year, made a tour of the North African provinces and that is why today France stands face to face with a great financial problem almost as large as that created by the war itself. In the war the native troops came forward by thousands to fight, not as colonials but as Frenchmen, and it is an unquestioned fact that France treated her colonials in the war as Frenchmen. The French population, in ten years, 1911-21, has fallen off 2,200,000 but Alsace-Lorraine has restored the balance. The influx of Italians in the southeast, of Spaniards in the southwest, and of Belgians in the northeast has added about 300,000 a year to the increasing tide of foreign residents, but, for all that, the population of France today is only 39,000,000 and is still steadily dropping at an astonishing rate. Yet in the fifty or more years since the Third Republic came into being on November 11, 1870, France has added to her colonial possessions 50,000,000 inhabitants and an additional area eighteen times greater than that of France itself. Her North African possessions, in particular, have proven to be a great reservoir of man-power and economic resources. In the first year of the war, all her colonies together furnished 107,000 soldiers. Between 1914-19, her Asiatic and African colonies freely and spontaneously offered 690,000 soldiers, two-thirds of whom came from North Africa, and of that total 250,000 fell in battle. In addition to this nearly 1,000,000 native colonials worked in France as factory hands, stevedores and longshoremen. In a material way, from the first to the last day of the war her colonies sent her 2,000,000 tons of grains, oils, fats, grease, meats, wines, timber, phosphates, and ores.

We all know of the French West Indies and French Guiana, with its Devil Island, which she acquired in 1635, with a total area of 33,200 square miles and a population of 500,000. We also know of New Caledonia and Tahiti in the Pacific and the French Asiatic possessions are equally well known. They are French India, acquired in 1679; Cochin-China, 1861; Cambodia, 1862; Annam and Tonking, 1884; and Laos, 1892, all with a total

area of 250,000 square miles and a population of over 17,000,000.

The following list shows the immense empire which France has carved out of Africa:

Africa	*Area in Square Miles*	*Population*	*Date of Acquisition*
French Morocco	220,540	5,400,000	1912
Algeria	222,580	5,563,828	1830-1902
Sahara	1,544,000	800,000	—
Tunisia	50,000	1,953,000	1881
Senegal	74,112	1,204,113	1637-1889
French Sudan	617,600	2,200,975	1893
Upper Volta	154,400	3,000,100	1893
Guinea	95,218	1,851,200	1843
Ivory Coast	121,976	1,407,030	1843
Dahomey	42,460	860,590	1893
Mauritania	347,400	240,144	1893
Military Territory of Niger	347,400	700,225	1912
Congo	779,270	10,000,000	1884
Reunion	970	174,000	1649
Madagascar	228,000	3,512,690	1643-1896
Mayotte	790	97,000	1843
Somali Coast	5,790	208,000	1864
	4,853,506	39,172,895	

Mandate Territories in Africa	*Area in Square Miles*	*Population*	*Date of Acquisition*
Cameroon	166,489	1,500,000	1919
Togo	21,893	500,000	1919
	188,382	2,000,000	

In general, the colonial policy which France has employed to solidify her empire has been a straightforward and liberal one, that of associating natives in the government to the greatest extent practicable. With this she has embodied three essentials: (1) Medical assistance, (2) Education, and (3) Justice. The medical assistance is unusually well organized, practical and far-reaching. The education has, on the one hand, been left sufficiently in native hands to preserve their traditions, but the higher schools and associated trades schools have been controlled by the French representatives. Organized justice has given to the natives what they have never known before: the free and peaceful enjoyment of what belongs to them. This last is the decid-

ing factor in native acceptance of French domination. She has organized thousands of dispensaries, thousands of schools, and has striven hard to cause the decisions of impartial judges to be respected everywhere. Of course, there are French courts to try European cases and the capitulations have not been entirely done away with.

Meanwhile, individually and economically, all of the French colonies require additional railroads, re-equipment of existing lines, additional telegraph lines and wireless stations, extensive harbor works, irrigation, roads, bridges, wells, mining machinery, shipping, public buildings, and other things required for the development of the inexhaustible resources which hold in their hand the future greatness of France. Left to local taxation it will take over fifty years to raise the necessary money. To realize it properly in this generation will require billions of francs advanced by France itself, but the salvation of France, economically and in man power, depends upon her raising these billions somehow. In addition to this she has incurred a great debt for the rehabilitation of her devastated regions. On top of this her projected naval program for the next twenty years calls for an annual appropriation of 300,000,000 francs. Unfortunately France has felt called upon to maintain an army of over 750,000 men ever since the armistice. You should know this before you fall in with the French so that you can understand the great problems which confront them.

I am glad, and you should be also, that you were made to learn to speak French fluently when young. Learning a language after childhood requires patience and almost continuous effort. While there may be such a thing as unusual talent for learning languages, if you dig for it and plug for it and plug along it will stay with you forever. A little language is a dangerous thing as it only brings complications, but, up to the right point, it opens up to you new literature, new ideas, new points of view, and makes you a citizen of the world instead of a local issue. Curiously enough, from a purely commercial standpoint fluency in languages, and nothing else, only qualifies you to be a porter in a hotel or a courier for travelers. As an adjunct to a liberal education, however, I know of nothing so distinguished, so humanizing, and so helpful to one's self-respect as a knowledge

of modern languages, and I hope you will not be contented with only French and Spanish.

You are going to fall in with French ships and French army officers in the Mediterranean and everywhere you will experience their frank, open and publicly-expressed gratitude for the aid we brought to them at the critical period of the war in turning the tide. They admit it, they acknowledge it, and they want us to know it. Our Army in France got a different impression at first, but that was because we did not express our appreciation of their courage and suffering during the three years before we came into the war and, by occasional boasting, made them sore. The discipline among the French colonial troops is admirable and the attitude of the officers towards them is charming in its simplicity and paternalism. The discipline in the French Navy is also improving by leaps and bounds. When the war came on, in 1914, the French Navy had not entirely recovered from the evil days of M. Peletin and after the armistice the war-weary personnel was much reduced in morale. Within the last two years it has regained its elasticity, its smartness and its gunnery efficiency. Its ships are as smart, clean and well-disciplined as any you will see. Unfortunately, France's army of over 750,000 men, which she has maintained ever since the armistice, has proven a drain on her financial resources and precluded any considerable expenditure on her navy. It has brought against her the charge of militarism. The plain fact is that France stands in a very perilous position politically and financially. Politically almost isolated, she is without guarantees against any assaults on her life similar to those of 1870 and 1914 and she is sailing close to the breakers financially. This is important to you only as opening your eyes to the real facts. France needs the financial assistance of French and foreign capital and enterprise in the development of North Africa. This is the best guarantee of France's future financial stability, for she will be rich again in time, especially if she is guaranteed against a third attack by Germany. This is a problem for statesmanship if not for friendship.

The problem of population France is solving in her own peculiar way. The French have no color line and readily mix with the natives of all colors. The French citizens in Algeria,

native and naturalized, have increased seventy per cent in twenty years, now numbering 830,000—four times the alien white residents. By the terms of the French naturalization law of 1889 whoever is born on French soil, of one or both parents also born there, is legally French. In Algeria the residents of Spanish and Italian descent largely outnumber the French. In Tunisia there are 85,000 Italians as against 55,000 Frenchmen, and these Italians have special treaty rights as regards schools, associations and citizenship, but there is grave friction growing over the citizenship question of the Italian and Maltese population. With only 45,000 French colonists in Morocco, and a large influx of foreigners attracted by business opportunities, a new problem will arise in that country. The French people do not readily leave France to settle permanently in the colonies and even the officials on duty in the colonies make frequent trips back to France. The large French population in Algeria is due to the fact that after the war with Prussia, in 1870, French citizens of Alsace-Lorraine were given special encouragement to migrate there. At the bottom of the low French birth rate is the French law of inheritance. The French people are tenacious of their ancient customs but the war has profoundly influenced the French and new impulses are stirring in the country.

Affectionately yours,

DAD.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SPIRIT OF THE OFFENSIVE[1]—III

By Lieutenant H. H. Frost, U. S. Navy

XVIII. Offensive Strategic Operations

The secret of all offensive strategic operations lies in Moltke's motto: "First weigh, then venture."

This is true despite the fact that some great soldiers have been noted for the fact that they have given little consideration to planning or to weighing the situation. They won victories and campaigns through their very impetuosity and tremendous driving power. Blucher was the perfect type of such a general, and one of the most successful. Ney was another, but he was never successful in an independent command. "Fighting Joe" Hooker in the Civil War was a third.

At first glance one might be tempted to place Suvorof in this class. It is true that he apparently never made a plan on the battlefield, but the instructions issued by him from time to time show that he had planned out in advance an almost inflexible system which was well designed for the conditions under which he fought. In all his early campaigns he was opposed only to Turks and Poles, and in his Italian operations he usually had superior numbers, and the enemy commanders were not of a high order. Despite his great daring and apparent recklessness, he was always successful and therefore his methods merit a careful study, because they would again be effective against an enemy over which we have a marked ascendency. They were accordingly followed with complete success by Cortez in Mexico, Pizarro in Peru, and the British in the Indian mutiny.

The strategial doctrine published by Suvorof may be seen in the following paragraph: "This quickness doesn't weary the men. The enemy doesn't expect us; reckons us 100 versts away; and

[1] Commenced in issue of December, 1922.

if we are a long way off to begin with, suddenly we're on him, like snow on the head; his head spins. Attack with what comes up, with what God sends."

A remarkable instance of this method was afforded by his conduct the first day of the Battle of the Trebia. His Russians came on the battlefield, from which their allies the Austrians were retreating, after having made a march of fifty-three miles in thirty-six hours in the hot Italian weather, to which they were little accustomed. "At four o'clock," writes Blease, "the Russian grenadiers marched on to the field. So great was their effort that Bagration, begging for a short rest, declared that the companies which left Alessandria 100 strong, now contained, on the average, forty men each. 'Only forty to a company?' exclaimed Suvorof, 'Macdonald will have only twenty. Forward, victory.' "The fiery old field marshal galloped along the front, shouting, 'Forward, forward! Cut them down, smash them!' The tired Russians then drove the French from the field at the point of the bayonet."

While Suvorof's methods would today be effective against a very inferior class of opponents, it will usually now be necessary to have a more flexible system. A permanent scheme of operations cannot be made long in advance, but a plan suited to the situation at the time must be made.

Hannibal's invasion of Italy was as daring an operation as was ever carried out, but it was based on a carefully weighed plan, which richly deserved success. When Cæsar advanced on Rome with but 5,000 men, he concluded that speed and time were more important than a large army, and the result justified his carefully considered plan of operations. Before Alexander invaded Persia, he had been studying the situation and collecting information for years; all his campaigns were based on methodical plans.

When Frederick forced the Austrians to fight at Leuthen, when he was inferior in the ratio of one to three, he was deliberately risking his kingdom on the chances of a single battle. That his example was remembered by the Germans in the World War is shown by an inspiring statement by Hindenburg: "When a commander on the battlefield throws in the last reserves he is only doing what his country rightly demands of him. He accepts full responsibility and finds the courage to take the last decisive step

without which victory cannot be won. A commander who cannot or will not dare to stake his last resources for the sake of victory is committing a crime toward his own people. If the blow fails he is certain to have the curses and scorn of the weaklings upon his head! That is always the fate of soldiers. To act only on absolutely safe calculations, or win laurels which are not dependent on the courage to take responsibility, is to banish the very elements of greatness." The fact that the Germans acted in accordance with this principle in the World War gave them a very great advantage and nearly won the war for them.

Sherman's march to Savannah is not now considered a very hazardous move, but at the time it was rightly considered dangerous and would not have been made but for the initiative of Sherman. The true facts are contained in a letter from the President, dated December 26, 1864: "When you were about to leave Atlanta for the Atlantic Coast, I was anxious, if not fearful; but feeling that you were the better judge, and remembering that 'nothing risked, nothing gained.' I did not interfere. Now, the undertaking being a success, the honor is all yours, for I believe that none of us went further than to acquiesce."

In making decisions regarding offensive operations it is necessary to be optimistic. Be willing to run risks and remember that Nelson said, "Something must be left to chance." Rely upon your ability to meet both unexpected and expected difficulties. These often clear away of their own accord.

Marshal Foch's inspiring optimism is illustrated by the following statement of Colonel Fagalde to Repington: Fagalde said, "Foch's accounts of a situation were usually rather prophetic than strictly accurate. In Marne days Foch had always told Joffre that all was well and would be better next day, even when he had lost some miles of ground. He always sent orders for his corps to attack the next day. All his commanders said that their men were done up, but they got orders to attack just the same. Finally the Eleventh Corps commander came personally and said that he was so depleted that he could not hold the line allotted to him, still less attack. But next morning, he, also, got his orders to attack, and fortunately the Boche ran away at last. It was Foch's idea that his will was superior to that of anyone opposing him, and that if he kept on long enough the enemy would go away."

The spirit of the offensive must be applied with ever-increasing force right up to the end of the war. Had the Carthaginian Senate applied this principle after Hannibal's first victories, Rome would probably have been defeated, but as Hannibal had been victorious the Senators stated that he required no further assistance, and sent all the reinforcements to Spain, where the Carthaginians had been suffering continual defeats.

In 1863, Sherman said: "We must fight it out. The moment we relax, down go all our conquests thus far." Grant's ideas coincided exactly with these and he deserves the greatest credit for the way in which he continued the pressure upon the enemy. A few days before the surrender of Lee, Sheridan reported that he believed the Confederate Army could be cut off and taken if the thing were pressed. Grant sent on this message to Lincoln; the President replied: "Let the thing be pressed."

XIX. THE LIMITED OFFENSIVE IN STRATEGY

Strategic operations with a limited offensive will now be considered. Such operations should be considered as a temporary expedient, which is either forced upon us by conditions over which the commander has no control or is made desirable by special conditions which are unusually favorable for such a form of warfare.

The underlying idea of this form of warfare is continual activity for the purpose of so reducing the enemy's strength that we may pass to the absolute offensive or of breaking down the communications of the enemy and thus compelling him to retire from his position. Inactivity should never be permitted, as it reduces us to a passive defensive.

There are a number of ways in which a limited offensive may be applied to a naval campaign:

1. Diversions with small forces, so as to attract stronger forces away from the battle and scouting forces of the enemy.
2. Attacks on the enemy line of communications so as to render his fleet inoperative for lack of supplies.
3. Attacks by our light craft on the vessels of the enemy battle and scouting forces, so as to reduce his superiority.
4. Operations with our scouting and battle forces for the purpose of forcing action on such portions of the enemy scouting

and battle forces as would give us a fair chance of defeating them.

Diversions are always valuable and frequent use should be made of this very favorable form of warfare. Mine-laying is extremely valuable. The Germans laid about sixty mines off our Atlantic Coast, while we had fifty-nine mine sweepers continually in service on the coast to sweep them up. The Germans always recognized the fact that it was just as important for them to keep the Allies busy sweeping for mines as to actually sink Allied ships with them. Submarine raids are also very effective. The Germans kept enormous numbers of men in the Allied nations away from the battle front by forcing their use in making up for the ravages of the submarine campaign. Aircraft attacks are a splendid form of diversion. The effect of the bombing raids on London is shown by the following statement made to Repington by General Robertson: "An account of the War Cabinet after an air raid made us all nearly die of laughter. After every little raid on London, the whole War Cabinet, shaking in its shoes after the bombing, assembles with the Ministers, Lord French, General Shaw, and the Air Board people and makes the devil of a fuss for two hours trying to find a scape-goat. Then French says that he has not been given the aeroplanes promised, which is true. Then the War Office is abused, and they show that they have not got them. Then they are ordered back from France, and then comes a setback in the air in France, and the machines are back again, whereupon follows a new raid on London, and all the thing begins again. The Boche would burst with laughing if he knew what fools he was making of us, and all the time there are a hundred raids on our men in France for one here. Moral—always bomb the seat of government when you can."

The Germans attacked with submarines the lines of communication leading into Great Britain with such effect as to nearly win the war. In this case, the lines of communication supported not only the Grand Fleet but the entire nation, and thus the submarine warfare developed from a subsidiary operation into a major one. The submarines also attacked the British communications leading to Salonika, while the British submarines nearly disrupted the sea communications of the Turkish Dardanelles Army. The Germans also twice attacked the Norwegian con-

voys to England with light surface craft and made several destroyer raids into the British Channel. It is difficult to see why the Germans did not make these highly successful attacks much more frequently. As it was, the British were forced to use battleships to escort the Norwegian convoys, and to place a pre-dreadnaught squadron in the Thames, thus causing to some extent a dispersion of their forces.

During the early part of the war the Germans used their light forces to wear down the British superiority in heavy ships. Their campaign cannot be said to have been effective. The mining of the *Audacious* and the sinking of a few pre-dreadnaughts and cruisers by submarines were the only important results.

Operations of the High Sea Fleet against portions of the Grand Fleet might well have been very successful. The sixteenth of December, 1914, might have changed the course of the war. At one time the six battleships of the 2nd Battle Squadron were within fifty miles of the High Sea Fleet and a contact seemed probable. Had it occurred, there was a probability of the British superiority being reduced to an equality in one day. The Germans would have had the further moral advantage of having won a great victory. Well might Tirpitz exclaim: "Ingenohl held the fate of Germany in the palm of his hand."

Scheer also had a great opportunity when engaged with the battle cruiser fleet and the 5th Battle Squadron at the Battle of Jutland. Any British ships which might have had their speed reduced a few knots would have come under the fire of the entire High Sea Fleet.

Of course, it must be realized that the Germans also ran considerable risks in these cruises of the High Sea Fleet, but as they had the initiative these risks would have been greatly reduced had not the British agents been able to give advance notice of every sortie of the fleet. The efficiency of the British Intelligence Service took away the advantage of the initiative.

XX. THE STRATEGY OF AN OVERSEA CAMPAIGN

Before leaving the question of strategy and passing on to that of tactics, it will be well to show one special case in warfare, which must be considered separately. This is the case of war between two nations situated at a great distance from each other, so that one fleet or army must make an exceptionally long cruise

or march to reach enemy waters or a vital part of enemy territory.

The strategic offensive in this case has difficulties and disadvantages which are not usually present in this form of war. At the time of the Athenian expedition to Syracuse, Hermocrates with unerring intelligence stated these difficulties: "Rarely have great expeditions, whether Hellenic or Barbarian, when sent far from home, met with success. They are not more numerous than the inhabitants and their neighbors, who will all combine through fear; and if owing to scarcity of supplies in a foreign land they miscarry, although their ruin may be chiefly due to themselves, they confer glory on those whom they meant to overcome."

It is true that history shows many failures of distant expeditions, such as Xerxes' expedition to Greece which ended at Salamis and Platea; the Athenian expedition to Syracuse; Crassus' defeat by the Parthians; Varro's overthrow by the Germans; the Crusades; the British attack on Carthagena; Napoleon's Egyptian and Russian campaigns; the British Afghanistan campaign; and Rodjestvenski's passage toward Vladivostok.

On the other hand, there are still many examples of successful campaigns at a great distance from home. Among these may be included Alexander's campaigns; several Roman attacks on Carthage; Lucullus' seizure of Armenia with only twelve thousand men; Cæsar's campaigns in Gaul; the great migrations of the Goths and Vandals in the fifth century; the cruises of the Northmen to England, Ireland, Normandy, and the Mediterranean; the British combined expeditions which captured Havana and Quebec in the Seven Years' War; and the campaigns of Clive in India. In the World War the defense of German East Africa by von Lettow-Vorbeck was similar to a distant campaign.

These illustrations show that the difficulties of distant campaigns, while great, are by no means insuperable. Where they were failures, they were largely caused by errors which would have lost any campaign; where they succeeded, their success was due, as it always is, to the good conduct of the commanders.

In an oversea naval campaign the fleet operating in its own waters and from its home bases has exceptional advantages over the fleet which moves over the ocean into enemy waters and improvises its bases. Calling the fleet operating in its own home

waters "White" and the other fleet "Black," the special conditions are as follows:

1. Black, having lines of transportation far longer than White, will be required to assign a far greater force to the duty of protecting these lines.

2. Black, during his advance to the sea area off the coast of White, will offer the latter exceptional opportunities of attacking with submarines, destroyers and aircraft.

3. Black usually will have no docking or repair facilities in the sea area in which the campaign is being carried on, so that his ships in need of repairs or docking must be sent to Black home ports for this work, thus greatly depleting his forces; on the other hand, White will have all the necessary facilities.

4. Black will probably lose all vessels seriously damaged, due to his not having docking facilities immediately available; on the other hand, White, having these facilities, will be able to save his damaged vessels. Imagine the condition of the *Derfflinger, Seydlitz, Marlborough,* and *Warspite* after the Battle of Jutland, if there had been no drydock within three thousand miles.

5. Black, having a very long line of transportation, must devote a large proportion of his national effort to the organization of the transportation service. White, having practically no lines of communication, can devote practically all his national effort to building up his fighting forces. In the World War we would have been able to devote very little effort to building up our battle force.

6. Black, having no shore facilities for aircraft, will be able to use them only with great difficulty; this applies especially to lighter-than-air-craft. On the other hand, White will be able to make the maximum use of his aircraft, operating them from shore bases, prepared in advance.

7. Black will have far less knowledge of the weather and geographic conditions than will White; such knowledge is necessary for carrying out operations, particularly in fog or unfavorable weather; it is particularly necessary for the efficient operation of all forms of aircraft.

8. Black will be unable to advance before he prepares a great transportation service after the declaration of war; this gives White a period in which he may make his preparations and takes from Black to a great degree the advantage of the initiative.

For these reasons a navy taking the offensive without limit in an oversea campaign should have a superiority of three to two in fighting strength over the enemy. In the same way, the nation fighting in its own waters should use the limited form of the offensive unless it is equal in fighting strength to the enemy. In this case, it should seek action before the enemy can retire to his own waters, thus compelling it in turn to cross the ocean to gain a decision.

XXI. THE OFFENSIVE AND LIMITED OFFENSIVE IN TACTICS

We will now examine the ways in which the spirit of the offensive may be applied to tactics. In land warfare a commander may often decide to fight a battle using the limited form of the offensive. All Wellington's battles were this kind at their commencement. At their conclusion, he often passed to the absolute offensive. The battle of July 15 on the Western Front was of the same order. The retirement of the French in the Champagne to their second line really took the initiative in this portion of the field from the Germans. The Soissons counter-attack was at the beginning only a limited offensive, but it was so successful that Foch soon passed to the absolute offensive along the whole battle line. The advance of the Germans across the Marne caused the local commander to revoke the order for this counter-attack, but Foch, getting wind of this, ordered it to be made as per plan.

In an army there are some arms which can be used only offensively; these are cavalry, tanks, and most forms of aircraft. Offensive arms must get to close quarters. Major Nicholson uses this fact as an argument for the adoption of the long straight sword for the cavalry. "The ideal weapon," he says, "is the cold steel, the long sharp sword whose gleam can cast terror into the enemy and whose weight and length provide an objective upon which the cavalryman can concentrate the whole of his energy and lust for slaughter as the infantryman does on his bayonet. It is the concrete expression of the desire for contact, the desire to close and smash with the enemy. This desire must find expression if our cavalry is to remain superior to its antagonists. To keep the cavalry spirit we must keep the sword. It is our concrete expression of the will for the offensive. And without the offensive spirit cavalry is as nothing."

In the same way our destroyers with their torpedoes and short range guns, our submarines with their torpedoes, and our aircraft with their torpedoes or bombs can only be used offensively; their weapons are only effective at short range and they must come to close quarters with their enemy.

The fact that the range of the torpedo has been increased so that it is well over 10,000 yards does not in the slightest alter the fact that it is effective at short ranges only. This firing range must depend, of course, upon the conditions at the time; it must always be the shortest permitted by the conditions, because it must be remembered that, even when an entire formation is selected as the target, the chances of hitting decrease very rapidly when the range increases.

In a day action destroyers can approach an enemy formation very much closer than is generally believed. At Jutland there are actual cases to prove this fact. The *Nestor* and *Nicator* attacked the van of the High Sea Fleet at extremely close range. "Very soon," writes an officer of the *Nicator,* "we were in the thick of a perfectly hair-raising bombardment from their secondary armament. We were engaging a light cruiser at the head of the line with all our guns, the range on the sights being 3,000 yards." The *Nestor* was hit and put out of action, but the *Nicator* escaped unhit. "It seemed perfectly extraordinary that, in spite of the tornado of shells that were falling all round us, we were never hit once except by a few splinters." Even in this case, the *Nestor* and the *Nomad,* which had been damaged previously by battle cruisers, were able to fire all their torpedoes before being sunk. "We were about 2,000 yards, as far as I can remember," writes an officer of the *Nomad,* "from the leading German battleship when we fired the last torpedo, and so were at practically point-blank range for their 11-inch and 12-inch guns." This shows that if destroyer officers are prepared to sacrifice their boats they can fire their torpedoes at very close range even in a day action. Later on in the day the *Onslow* and the division of destroyers led by the *Shark* went in very close to the German battle line, and while almost all of these boats were damaged, only one was sunk, and even this one had opportunity to fire all its torpedoes. Even the Third Light Cruiser Squadron closed in to within 7,000 yards of the German battle cruisers and held this position for some time,

only one hit being received, and that way up on the foremast of the *Falmouth*.

Later on the German destroyers closed to within about 7,000 yards of the whole British battle fleet without the support of the fire of their own battleships. Although nearly all their destroyers attacked at this time, only two were sunk. The British fairly covered them with turret and secondary gunfire and claimed to have sunk a very large number of boats, greatly overestimating the effect of their fire.

The German battleships were probably as well equipped and trained in night fighting as any ships will ever be. Nevertheless, the British had remarkable opportunities for torpedo fire at point-blank range. For example, the *Spitfire* had three opportunities for short range torpedo fire. "The last destroyer in the line," writes one of her officers, "reported three ships closing us from astern, and shortly afterwards we could distinguish them as what appeared to be three four-funnelled cruisers. Occasionally flames from their funnels could be seen, but their identity could not be established. As they kept closing us and the *Tipperary* did not challenge, we concluded that they must be British, but when they were in to, I should think, 500 to 700 yards' range and nearly abeam of us, *Tipperary* made the challenge." A short time afterward the *Spitfire* and the German battleship *Nassau* rammed each other port bow to port bow. Finally a large cruiser missed her stern by only a few feet.

The *Tipperary*, *Ardent*, and *Fortune* were sunk at point-blank range, but even in this case, both the first two ships were able to fire torpedoes, so that the leading signalman of the *Ardent* was able to say as the ship was sinking, "Well, the old *Ardent* done her bit all right, sir." A little later the *Petard*, followed by a number of boats in column, sighted an entire column of German battleships only 500 yards off.

Destroyers should therefore consider 8,000 yards as their maximum range in a day action; on many occasions they will be able to cut this firing range in half. At night 1,000 yards should be the maximum range and captains should endeavor to get to within 500 yards of the enemy before firing. Whenever a detected attack is made, the range should be closed until the enemy's fire is effective and at least one fourth of the attacking boats are put out of action. In some cases, where there is a good prospect of get-

ting the torpedoes across the enemy's line before he detects the attack, it may be justifiable to fire at slightly greater ranges, as this form of attack deprives the target of an opportunity to avoid the torpedoes by maneuvering.

The gunfire of destroyers is also effective only at short ranges, due to the small caliber of their guns, the lively motion of the boats, and the exceptionally great rate of change of range. Their target will also be very small, usually a destroyer; if a large ship is the target, small parts of it, such as searchlights and the bridge, will have to be selected, as the greater part of the ship will be protected by armor which a destroyer's guns cannot penetrate. These facts also make necessary a vigorous offensive for destroyers, even when gunfire is their primary weapon.

While submarines have torpedoes which will run a moderate range, it is generally recognized that their torpedo is a short range weapon and that it can be used most effectively when fired from 300 to 700 yards from the target, which should be a single ship and not an entire formation, except when the inferior speed of the submarine prevents it from gaining this position. The submarine in battle is a purely offensive weapon.

Aircraft also have short range weapons; to hit ships with bombs they must fly at a very low altitude; to hit with torpedoes they must come in to the firing range of a submarine. Bombing and torpedo planes are therefore solely weapons of offense.

The question of the offensive as regards the battle force as a whole will now be considered. This force is composed of all types of ships necessary to fight a fleet action: battleships, destroyers, fleet submarines, and aircraft carriers.

In land warfare the conditions are somewhat different from those which exist in war on the sea. In the first place, there is no way of refusing action if the enemy wishes to fight. But, by acting on the limited offensive, the protection of trench systems and field fortifications give such great advantages that this form of warfare is often resorted to. An excellent example is the use made of the lines of Torres Vedras by Wellington; in this case he was almost as secure against attack as a fleet in its own bases.

In naval warfare, it has thus far proved practicable for a fleet to refuse action by keeping within such a close distance of its bases that it cannot be cut off by a superior fleet or forced into

action by one pursuing with greater speed. However, this means a passive defensive; the limited offensive requires operations farther afield and there is a considerable chance that a fleet operating in this way will be brought to action. Thus Hipper with the German battle cruisers was overtaken by the superior and faster British battle cruisers at the Dogger Bank, and at Jutland the High Sea Fleet was cut off from its bases by very superior British forces. In such cases, it will usually be necessary to make use of the limited offensive in battle to disengage the battleships from the superior enemy force.

A fleet acting on the limited offensive lacks, of course, the advantage which the protection of the ground gives to an army on land, but a very similar factor has recently been introduced in the torpedo, the mine, and the smoke screen. These are all more useful in a fleet acting in accordance with the principles of the limited offensive than on the absolute offensive. In this kind of battle the light forces—destroyers, submarines, mine-layers and aircraft—must be used in a most vigorous offensive, as there is a good chance that the superiority of the enemy may be so reduced by these attacks that our entire battle force will be enabled to turn and take the offensive. Destroyers may always disengage a force of battleships by laying a smoke screen between them and the enemy, but they must always keep in the screen or must lie in ambush close behind it for a close range attack on enemy battleships which may push through the screen in pursuit.

The question now arises as to whether an inferior fleet should use the tactics of the limited offensive only when it is having action forced on it against its will or whether it would be advisable for an inferior fleet to deliberately offer battle with the idea of using the limited offensive to reduce the enemy's superiority and then passing to the offensive to complete the victory. This latter procedure opens out interesting possibilities. It requires for success great mobility and perfect co-ordination between battleships, battle cruisers, light cruisers, destroyers, submarines, and aircraft. The High Seas Fleet had both of these requisites to a very high degree. The maneuvering ability of the battleship squadrons and the perfect co-ordination of different types far surpassed anything yet attempted in naval tactics. Nevertheless, Scheer did not use the limited offensive, but brought his battle

squadrons twice into action at close range; there is every reason to believe that he would have brought on a continuous action had his tactical position and the visibility not been so very unfavorable. The German admiral reserved the use of the limited offensive to the disengagement of his battle squadrons from these two unfavorable positions. This course of action is believed to be correct; if action is deliberately sought, the fleet should fight on the offensive. It is believed that an inferior fleet has an excellent chance of partially defeating one far superior to it, if it has the advantages of mobility and co-ordination over the enemy fleet. It must be realized, however, that such a partial victory will seldom be decisive, due to the superior strength of the enemy, but several of these actions in succession may well so reduce the enemy's superiority that a battle with equal forces may be fought.

XXII. *Summary*

The conclusions arrived at in this paper will now be briefly summarized.

1. Our personnel, and particularly the officer personnel, must have the spirit of the offensive.

2. In the development of this spirit our military and naval tradition should be made use of persistently, and every opportunity should be taken for building up new tradition.

3. Our War Instructions and our courses of instruction in strategy and tactics should emphasize the value of the spirit of the offensive, and should prescribe its application in warfare.

4. Officers should be encouraged to read military and naval history, as this is certain to demonstrate the advantages of the spirit of the offensive and to create a military and naval atmosphere in their minds, thus accustoming them to the conditions of warfare and inspiring in them a real fighting spirit.

5. The influence of the commander upon his forces is very great; therefore officers should be so trained in peace that a spirit of boldness and eagerness to take chances will be encouraged; only officers of proved boldness and resolution should be appointed to flag commands afloat.

6. The most potent method of maintaining the spirit of the offensive in war is to win victories in the field and gain a marked ascendency over the enemy.

7. The bad effect of exhaustion must be recognized, and it

should not be considered a disgrace for a commander, who has previously done excellent work, to be relieved for this reason.

8. As we win successes, our efforts should not be relaxed, but should be increased. The enemy must be pressed to the very end.

9. An offensive spirit is of no value unless we have an organization in which it can be successfully used.

10. Flag officers should be given every opportunity to develop their power of decision. Strong staff officers are essential for preventing changes of plan once the decision has been made.

11. The development of War Instructions for all classes of vessels should be given first priority and these instructions should be tested rigidly in maneuvers; all officers should be trained in their application.

12. Courses of instruction for war staff officers should be commenced, and graduates of this course should be assigned to all staffs. Administrative details should not be allowed to interfere with their more important work of war preparation.

13. Whenever naval forces leave for a cruise all measures which would be taken in war should be carried out; no cruise should be taken without the execution of some tactical or strategic problems enroute.

14. All offensive operations have two advantages: surprise and increase of morale.

15. A force acting on the offensive has an advantage of about twenty per cent over one operating on the limited offensive and forty per cent over one assuming a passive defensive.

16. In a campaign in which both nations are within easy striking distance of each other, only a decided inferiority in fighting strength or strategic position justifies the limited offensive.

17. A passive defensive is never justified.

18. In an offensive campaign careful planning is an essential. In the estimate of the situation do not exaggerate the strength, ability, and strategic position of the enemy. This will paralyze offensive action.

19. In an offensive campaign a commander should not hesitate to risk everything in a fleet action, into which all his forces should be thrown. If he has a decided ascendancy over the enemy, the rapidity and impetuousity of Suvorof's attack should be his

guide. If the enemy is of nearly equal ability, Nelson's careful planning and vigorous execution should be his model.

20. If it is necessary to use the limited offensive, constant activity is the first essential. This form of operations should be regarded as no more than a temporary expedient and a commander should be prepared to pass to the offensive as soon as the conditions will permit.

21. In limited offensive operations the battle and scouting forces should be constantly used, as well as the light forces, and whenever we have fair chances of success in a fleet action with the whole or a portion of the enemy fleet, such an action should be forced.

22. An oversea campaign should be considered as distinct from the usual form of close campaign. For us, however, a naval campaign will probably take this form, and it is therefore important for us to consider it carefully.

23. In such a campaign a force operating in its own waters and from bases prepared during peace has such unusual advantages that a limited offensive may be desirable, where in a close campaign it would not be justified.

24. In an oversea campaign the force acting on the offensive and proceeding into enemy waters should have a superiority of about three to two to have an even chance of winning the campaign.

25. It is not considered advisable to offer battle deliberately with the idea of fighting on the limited offensive, as this requires almost perfect co-ordination and unusual mobility to have a reasonable prospect of success.

26. In case, however, one force has action forced on it against its will, then it should act on the limited offensive; this should always permit a retirement without severe losses. In fact, there is a possibility that considerable losses may be inflicted on the enemy by destroyers, submarines, mine-layers, and aircraft, and the retiring force should be prepared to turn and assume the offensive.

27. In all other cases each fleet should take the offensive in a fleet action. It is considered that superiority in co-ordination and mobility gives an inferior fleet excellent chances of winning a partial victory over a more powerful, but unwieldy, enemy. If

the superiority of the enemy in numbers is very great, it will probably be necessary to win several such partial victories, before a decision can be gained.

28. Destroyers, submarines, and aircraft are offensive arms only and should always be so used, even if the battle force as a whole is operating on the limited offensive.

29. Actual battle experience has conclusively demonstrated the fact that destroyers can and must use very short firing ranges. The maximum range for high visibility attacks in daylight should be 8,000 yards and the firing range should not exceed 1,000 yards during darkness or low visibility. It will usually be possible to reduce these ranges by one half, without more than one fourth of the attacking units being put out of action. This latter condition should be fulfilled in destroyer attacks, unless there is a chance to get the torpedoes across the enemy formation before the attack is discovered, when torpedoes should be fired, before there is a probability of the attack being detected.

30. Submarines should use firing ranges from 300 to 700 yards, unless they are prevented from gaining these positions by their inferior speed.

31. In case it is difficult to decide upon the form of operations to be carried on, the benefit of the doubt should always be given to the offensive.

32. Every mistake in war is excusable except inactivity and refusal to run risks.

(The End)

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

OUR PRESENT NAVAL SITUATION

By Commander R. A. Koch, U. S. Navy

November 11 is the fourth anniversary of the Armistice and the first anniversary of the meeting of the Limitation of Arms Conference.

During the past year there have been many articles on this conference, and many arguments on what our naval policy should be. Without attempting a complete review of the subject, it is possible to briefly state the accomplishments of the conference; the need of the Navy; its cost; and what should be our constructive policy.

Accomplishments of the Conference

We recommended definite limits on all classes of fighting craft, based on the ratio of the actual existing battleship strength of the five principal naval powers.

The following is quoted from an address delivered by Rear Admiral H. S. Knapp, U. S. Navy, on April 27, 1922, before the American Society of International Law, and published in its *Proceedings* for that year:

"A convenient method of examination will be a comparison of the proposal put forward by the Secretary of State on November 12, 1921, with the actual accomplishments of the treaty. Reduced to its lowest terms, the proposal consists of the following main points definitely stated:

"(1) Limitation of the total tonnage of capital ships (battleships and battle cruisers) for each of the signatories. This was established.

"(2) Limitation of the size of future capital ship units. This was established.

"(3) Limitation for each of the signatories of the total tonnage of auxiliary combatant ships classified as follows:

"(a) surface vessels, and

"(b) submarines, neither of which class was limited and

"(c) Airplane carriers, which class was limited.

"(4) Limitation of the size of guns to be carried on board auxiliary combatant ships. This was established.

"(5) Restrictions upon disposal and building of all classes of combatant ships, as follows:

"(a) no disposal for use in another navy, which was accomplished.

"(b) no acquisition from foreign sources, which was partially accomplished, but not entirely.

"(c) no building for foreign account, which failed of accomplishment.

"The ratio of the floating naval strengths to result eventually between the signatories from the acceptance of the American proposal did not appear therein as a definitely stated feature, none the less, the ratio is there, a very important feature, deducible from the tabulations of the proposed allowed strengths in each of the several combatant classes, for each of the signatories of the three principal naval powers. It was accomplished in part, for capital ships and aircraft carriers only.

"Another feature of the proposal that was not definitely stated was the abolition of competition, but the idea lay behind the whole program. It was not so much armaments themselves that had brought the world to the point of exasperation as it was the swollen armaments resulting from competition. Some armament is recognized as a necessity by all but a few extremists; and in this connection it will be recalled that the President of the United States, before the Conference met, took occasion to warn the nation that the Conference was not one for disarmament but for the limitation of armaments. The treaty abolishes competition in two classes only, battleships and aircraft carriers. These are the most expensive ships to build because of the great tonnage of units; but they are not the most expensive per ton. In the cruiser, flotilla leader, destroyer and submarine classes, the nations are free to continue competition, untrammeled by the treaty

except for the restrictions placed upon the size of individual units (10,000 tons) and the caliber of guns (eight inches). In passing, it may be noted that competition in the past has not been confined to total tonnage or numbers; it has existed in the design of ships and guns, each nation endeavoring to obtain greater offensive and defensive powers in new designs. Unrestricted competition in design has resulted in constant increases in size of both ships and guns. There is no reasonable objection to competition in design within fixed limitations, such as are provided in part by the treaty, but not entirely; for example competition in design can still go on in the size of destroyers or submarines up to the 10,000-ton limitation, and in their armament up to eight inches, as well as in their numbers.

"Two other limitations, not mentioned in the proposal, were established by the treaty, both of value because looking toward the general aim of the Conference, and neither objectionable because affecting equally all the signatories. These are the limitation of the size of auxiliary combatant ships (27,000 tons for aircraft carriers and 10,000 tons for all others, which latter is practically a cruiser limitation), and the limitation of the caliber of guns to be carried on board capital ships (sixteen inches). It should be added that regulations for the conversion of merchant vessels, provision for which was declared by the proposal to be a necessity, were established to the small degree of forbidding preparations in time of peace other than stiffening decks for guns not to exceed six inches in caliber.

"It is interesting to note the relative tonnage proposed to be scrapped by the American program. In the following comparisons the American tonnage scrapped will be used as the basis, reckoned as 100 per cent, and the order of mention will be United States, Great Britain and Japan in each instance. Considering total capital ship tonnage scrapped, the percentages are respectively 100, 69 and 53. This is the comparison usually stressed in non-technical comment, but it is very misleading because it includes for all three nations a number of superannuated ships due already or about to become due, for scrapping, Conference or no Conference. The fairest comparison is based upon new tonnage laid down plus that about to be laid down and for which expense had been incurred in the preparation of material; on this basis the respec-

tive percentages are 100, 28 and 46. The offered sacrifice of the United States was not only the greatest absolutely; it was greatly out of porportion to the relative ratio of strength proposed to be retained. There is no gainsaying the generosity of the American offer. No further concession was needed to make manifest the sincere attitude of the United States; nor should the United States have been expected or asked to make further concessions —certainly not unless the result would affect all equally and not involve an additional relative sacrifice by the United States.

"The concessions offered went further than accorded with the general sentiment of experienced officers of our Navy. Occasion is taken to say here that the general sentiment of American naval officers was not in opposition to limitation, but quite the reverse. That officers were not prepared to go as far as others might was, however, both natural and proper. The Navy is the country's first line of defense, and its personnel deeply feels the responsibility entailed. Its motto for the country is "Safety First"; its duty is far-sighted preparedness—such preparedness as the action of other agencies of the Government may make possible. In advice or action, naval officers have a life-long responsibility for the security of the nation, in which respect they, in common with their brothers of the Army, are in quite a different position from that of any other persons in the Government. Questions of immediate expediency do not have much weight with them, and they are not perhaps so inclined to take chances with national security as those having a shorter tenure of office. Upon them is bound to fall the brunt of an underestimate of the necessity for defensive measures. That they are conservative is the natural consequence. Their conservatism did not, however, go so far as to lead them into opposition to the principle of limitation of armaments.

"The opening sentence of Art. XIX of the treaty reads: 'The United States, the British Empire and Japan agree that the status quo at the time of the signing of the present Treaty, with regard to fortifications and naval bases, shall be maintained in their respective territories and possessions specified hereunder.'

"When the specifications are read all the territories and possessions to which they refer are seen to be insular. The agreement includes everything insular that Japan holds now or may acquire

outside of the Islands of Japan proper; it includes our Aleutian Islands and everything insular, present or future, under our flag west of the Hawaiian Islands; and it includes Hong Kong and present or future insular holdings of the British Empire east of 110 degrees east longitude, excepting the Canadian Islands, Australia and its territories, and New Zealand. It will be noted that the language of the article is 'fortifications *and* naval bases,' not 'fortifications *of* naval bases,' which latter would have been much less sweeping. Status quo is defined in the last paragraph as follows: 'The maintenance of the status quo under the foregoing provisions implies that no new fortifications or naval bases shall be established in the territories and possessions specified, that no measures shall be taken to increase the existing naval facilities for the repair and maintenance of naval forces, and that no increase shall be made in the coast defenses of the territories and possessions above specified. . . . . .'

"An examination will now be made of the equities of this remarkable graft upon the proposal of the Government that called the Conference. The proposal made no mention of naval bases, or naval facilities of bases, or fortifications or coast defenses, and it must be presumed that the omission was deliberately intended after months of preparation for the Conference.

"Mahan gives position, strength and resources as subjects for examination in determining the availability of a situation for a naval base. Actual strength and existing naval facilities will first be considered, in doing which it must be remembered that the details of foreign fortifications are rarely known accurately; their general scope is, however, usually known or believed to be known.

"The United States has in Guam a location for a naval base that is wonderfully situated strategically. To state that its fortifications and equipment are derisable now is to disclose no secret. This is no fault of the Navy, which for years has sought in vain for the appropriations to make Guam a secure base. In the Philippines there is another great site for a naval base in the Manila region. The entrance to Manila Bay is fortified, but the fortifications need modernizing and the naval facilities are far from being what would be necessary to support the operations

of a fleet in war. To meet a menace to the territories under our flag in the Western Pacific, we need a secure naval base in the Philippines and another intermediate between them and the Hawaiian Islands. While neither Guam nor Manila is in efficient condition to support a fleet in war, up to February 6 last, the United States possessed the sovereign right to make them so.

"The British have at Hong Kong a naval base now strongly fortified and well provided with supplies and equipment, including drydocks, either on the island or in the leased territory of Kowloon on the mainland just across a narrow channel. Hong Kong is ceded territory; Kowloon is leased only. Yet the two are really a whole for British purposes, and Kowloon does not fall under the inhibition of Art. XIX, for it is not insular. In the convention of June 9, 1898, between Great Britain and China for the extension for ninety-nine years of what was therein designated as the 'Hong Kong territory' although the extension was entirely on the Kowloon—mainland side, the right to erect fortifications is recognized. As far as Art. XIX under consideration goes, the right is not denied to the British to fortify and increase naval facilities on the Kowloon side at Hong Kong. It is evident that the British exercised no self-denial in subscribing to Art. XIX."

We made by far the greatest sacrifice. We scrapped our potential naval power consisting of thirteen capital ships well along in their construction on which we had already spent one-third of a billion dollars, and which when completed, would have given us undisputed naval supremacy. We relinquished our right to fortify our possessions in the Western Pacific, thereby reducing our potential naval power in the Far East to an almost negligible amount.

As agreement of limitations was reached only on two classes of ships—capital ships and airplane carriers—competitive building has not ceased.

THE NEED OF A NAVY

A navy is essential if we are to exert our influence effectively for the general good; support and secure our national policies; protect our own interests and maintain our security as a nation. The Navy protects our commerce; protects the interests of our

citizens, and is thus essential to our general welfare and future prosperity affecting every citizen. Our foreign policy is as strong as our Navy and no stronger.

The part the Navy has played in all great wars has been largely overlooked. It can be given as an almost invariable rule that ultimate success in war lies with the power that controls the sea, having the resources of the world at its disposal and strangling its opponents by blockades.

It must not be forgotten, however, that the Navy is only the first element of seapower which consists of: (1) Navy; (2) Naval and Commercial Bases; (3) Merchant Marine. To these might well be added radio and cable communications.

Sea power is the firm support of peace-loving statesmen. Wisely controlled, it constantly exerts a silent pressure on those who would by the exercise of ruthless ambition, override the right of their neighbors to go about the legitimate business of life in a peaceful, orderly manner; it insures justice and fair treatment to those of our citizens who undertake trading ventures abroad; it enables this country peacefully to perform its legitimate business with the rest of the world without recourse to force of arms to preserve its just rights.

COST OF THE NAVY

The per capita cost of the Navy is about $3.00. In the Agricultural Districts where the Navy is most opposed, the cost per capita is about twenty-five cents.

The exports of agricultural products amount to about three billions annually and are approximately half of our total exports. Our first Navy was built to protect our export of wheat through the Mediterranean when we decided to quit the policy of bribing the Barbary States to obtain our rights. An Agricultural District is properly represented when its vote is cast for a fully adequate Navy. There is much misinformation about the burden of the Navy—generally the cost of past wars are included which cost is principally "the cost of unpreparedness." The Federal taxes although not as evenly distributed as local taxes amount in total to about one-third of the total taxes, and the Navy is only allotted eight per cent of this third or about two and one-half per

cent as an average, and only about one-half of one per cent in States of the Middle West where the Navy is most opposed.

There is adverse comment on the small expenditures made by the Federal Government for education; this is not a function of the Federal Government, but one of the chief functions of the Federal Government is to "provide for the common defense." In local taxes, over one billion dollars are collected for schools; this may be insufficient, but education is no more a federal function than is the police force or fire department.

The Navy as an asset to industry alone, has probably paid for itself. The following is quoted from a lecture delivered by Rear Admiral J. K. Robison, U. S. Navy, and Chief of the Bureau of Engineering, Navy Department, before the Michigan Bankers' Association at Detroit, Mich., June 10, 1922.

"I believe I can state without exaggeration that the Navy has done more for commerce, science and labor than any other existing department of the Government. This appears to be an astounding statement in regard to a service whose duty is popularly believed to be confined to fighting battles. Let us examine the facts. The people of our country have first and last spent a lot of money on the Navy, and they have loyally supported it with the knowledge that the money spent was for necessary national insurance. If they knew the money spent was something more than a fire insurance premium, that it was the means of building up the national wealth through the stimulation of industry, our ultra-pacifist friends would have less luck in appealing to the prejudices that many of us have against paying taxes in time of peace to support an efficient Navy.

"The great stimulation of industry in the United States began in the early eighties and dates from the birth of the 'New Navy,' the original 'White Squadron' which rose out of the ashes of the old Civil War Navy, which, neglected through national lack of interest in events outside our own borders, had all but disappeared.

"The Act of August 5, 1882, provided for two cruising steam vessels to be constructed of *steel of domestic manufacture*. This requirement aroused the fierce opposition of the shipbuilders because the steel industry of the United States could not furnish enough mild steel for the construction of two vessels of less than

5,000 tons. Industry in the United States used either wrought iron or imported steel from England. In addition the steel we made was inferior and did not come up to the specifications prescribed by the Navy Department. The American Iron companies refused to erect the costly mills to handle the new material required unless they were guaranteed a volume of business that would justify the original investment. These mills were not built until the contracts for the New Navy were let. The Navy Department stood pat on the specifications and insisted on the best grade of steel that could be produced. The mills were forced to experiment until they could make this steel. When they learned how they found it was just as cheap to make good steel as poor steel. Steel suitable for ship plates dropped from eight and one-half to four and one-half cents a pound. This was lower than wrought iron and brought steel within the reach of every industry. Domestic consumption of steel increased a hundredfold as steel was applied in many trades that hitherto had used other materials. The United States Steel industry is now the greatest business in the world. The late Andrew Carnegie said this industry was built up on the United States Navy, whose contracts, specifications and inspection work made steel what it is today.

"The growing Navy demanded in addition all manner of cast, forged and machined steel. This demand called for better and larger machine tools and this industry began to grow apace. The insistence upon a domestic production and the success of the country's machine designers and operators caused a revolution in methods. America became independent of Europe for machinery and new items were added to our export trade. Machines large and accurate enough to handle turret mounts and big guns were equal to any task of private enterprise.

"The Navy Department starting as the parent of industry became its pacemaker. Each new set of specifications set the requirements a peg higher. In battle nothing but the best is good enough. The manufacturer charged the Navy more for the best until he learned how and then quantity production brought the price down to the old level of the inferior product. Private industry could not do this.

"The reason the Navy gives greater stimulation to industry than does private business is that the Navy exists to defend the nation, while private business exists for profit. Private concerns must consider the cost of materials. The Navy is concerned with the quality of materials. Victory cannot be measured by money. If a gun can be built of material that will give greater range, greater endurance and greater accuracy we must have it even if it costs ten times as much as another gun that is not as good. It has been truly said that in battle a second best Navy is like a second best poker hand. Then again on board ship weights must be kept down in order to get the most out of the tonnage. On shore cheap, heavy cast-iron can be used where on board ship you will find forged steel. In addition since metals corrode more quickly at sea than on land there is need for special bronzes and alloys. The Navy has built up the industry in these classes and recently by large orders has put the important Monel Metal industry on its feet. The Navy Department organized and paid for the research that discovered the harmful effect of sulphur on steel and improved the manner of working it to bring out its maximum strength. These discoveries were turned over to industry with the result that the whole nation profited with its safe and reliable automobiles, street cars, elevators and so on. The armor plate industry has carried on more research into methods of treating and alloying steel than any other industry.

"The demands of the Navy for high speed ships combined with low weights necessitated the design of whole plants for our new vessels. The Bureau of Engineering was forced to design these plants, to invent parts that had never been developed, and to conduct a laboratory for constant research and improvement. The urgent demand for increase of speed, reliability, and safety, with vital necessity of economy in fuel consumption has made the Navy the pioneer in all new developments. The merchant service has followed step by step the increase in steam pressures, multiple expansion engines, turbines, internal combustion engines electrical and geared reduction to propeller speeds, which were all developed by the Navy.

"In the electrical field the Navy was again the pioneer. Starting with the incandescent lamp every new electrical discovery

has been fathered and adopted by the Navy before its commercial use has been found practicable or profitable. The Navy Department enabled the General Electric Company to produce the first electrically propelled ship in the *Jupiter,* now the aeroplane carrier *Langley.* This development is one of the greatest in the art of ship propulsion and has been adopted for all future battleships. The radiophone which is now the talk of the country is simply the coming into commercial use of a development that has been in general use in the Navy for the last five years and was installed experimentally in 1907.

"The great radio telegraph plants that now encircle the globe are owned and operated by the Navy. Without the Navy's interest, experiments, and research, as well as the substantial contracts to manufacture, the radio industry in this country would be wholly in foreign hands.

"The radio compasses that flank all our great ports are owned and operated by the Navy. By their use any vessel by simply requesting her position by radio can be told to a degree what her direction is from each station within call and thus fix her position whether in fog or storm. This makes navigation secure and saves many a big liner from disaster as well as delay in making port.

"In our anxiety to have the best produced in every field of industry every promising device is built and tried out to determine its merit. If rejected, manufacturers are saved the loss of attempting commercial production. If a success they benefit by it. Rigid specifications that require the highest possible results lead to constant improvement and development in manufacturing materials and methods. The results are at once reflected in improved commercial products. A simple case in point was that of a large pump manufacturer whose product was good, but capable of much improvement. The Navy on a large order for pumps required a tensile strength for the naval brass of which they were made of 30,000 lbs. The manufacturers claimed that this was impossible and in their contention they were supported by the rest of the trade. The Bureau of Engineering insisted and pointed out that by experimenting with different heats the solution of the problem would be found to be one of temperature. This proved to be the fact and tensile strengths of 50,000 lbs. were

easily achieved. This resulted at once in a lighter, cheaper and more reliable pump.

"In the same way the money we spend for aviation is devoted to study, experiment and research to develop the utmost with the means available. Each new stride in aviation brings the art nearer the goal of profitable commercial use.

"So far I have alluded only to the material side of industry, but there is another side that is more important, that is the personnel side. Due to the fact that the great bulk of the enlisted personnel enter the Navy at an age that precludes knowledge of trade, it is necessary that they be taught one. For this purpose the Navy has become one of the greatest trade schools in the world. On board ship there is scarcely a trade of any importance that is not represented. A battleship is a miniature city, with all the activities of an industrial city represented. Ships nowadays must be practically self-sustaining so that everything that goes into its manufacture must be capable of restoration or repair. As the periods of enlistment are short this great body of young mechanics is turned out into the industrial world in a steady flow, 67,000 last year. What the Navy loses industry gains. All may not qualify but all have improved in knowledge, physical strength, discipline and self-reliance. A crew of 1,200 boys that can keep a battleship going can keep any other plant going.

"Graduates of the Naval Academy equipped with special technical knowledge have passed into civil life and made national names for themselves. Among these may be mentioned Homer L. Ferguson, President of the Newport News Shipbuilding Company, and former President of the National Chamber of Commerce; Joseph Powell, recently head of the Bethlehem Shipbuilding Plants; W. L. R. Emmet, Consulting Engineer, General Electric Company and designer of electrical ship propulsion; Professor Michelson of Chicago University, probably the greatest living scientist; Sprague, Fiske, and dozens of others who have gotten their training in the Navy. The Navy turns out men skilled in all the present day trades except farming, mining and masonry. The custom of shop mechanics having to operate a single machine has tended to seriously reduce the number of all-round mechanics. The mechanic on board ship being chiefly engaged on repair work gets a wide variety of experience and has

less trouble in finding a job during periods of industrial depression than those with limited training in private plants.

"There is another phase of Naval activity to which I would invite your attention. One of the chief missions of the Navy is to protect trade. In all regions of the world where trade would go and where political conditions are unsettled you will find our Navy on the job seeing that our commerce and our business men get the protection they require.

"In the far reaches of the Yangste Kiang, 1,700 miles up the river, you will find our gunboats guarding our interests, settling troubles and protecting against pirates. This costs the Navy $3,000,000 a year, but our trade with China is over $145,000,000. Our destroyers are operating in Turkish waters and the Black Sea, protecting our tobacco trade of $15,000,000 and our oil trade with Batoum. An American Admiral sits as High Commissioner at Constantinople and combines diplomatic with naval authority to see that our trade is unmolested. Due to his efforts our trade with the Near East has increased 1,000 per cent in the last two years.

"Our naval forces in the Carribean protect our great fruit trade of $50,000,000 annually coming from that region. Revolutions are constantly occurring and without the protection of our ships our fruit steamers would be held up, cargoes ruined by delays and trade outlets destroyed. As it is now fruit cargoes move with certainty and adherence to schedules of passenger trains in the United States."

WHAT OUR CONSTRUCTIVE POLICY SHOULD BE

Our naval policy is defined by the spirit of the treaty. It is, and can be nothing else than that the United States shall maintain a naval strength on a parity with that of Great Britain and five-thirds times that of Japan. This policy having been provided by the treaty-making power of our Government, it follows that if we maintain the policy thus formally declared we must not only build sufficiently in all classes not limited by the treaty, but provide adequate personnel so that our ratio as thus prescribed may be preserved.

Unfortunately it has been generally overlooked by the public that the strength of our fleet depends almost entirely on the effi-

ciency of its operation. If the 5-5-3 ratio is to have any significance we must maintain the ratio in personnel as well as in material.

The following tables show the relative strengths in cruisers and submarines, of Great Britain, Japan and the United States:

LIGHT CRUISERS LESS THAN TEN YEARS OLD

Country	*Built*		*Building*		*Total*	
	No.	Tonnage	No.	Tonnage	No.	Tonnage
Great Britain...	44	218,390	5	34,600	49	252,990
Japan.....	10	51,210	15	106,520	29	157,730
United States...	0	———	10	75,000	10	75,000

The United States should have a light cruiser tonnage five-thirds times that of Japan. In order to maintain this ratio, 262,883 tons of light cruisers are required. We are short of this ratio 187,883 tons, about nineteen ten-thousand ton light cruisers.

SUBMARINES

Country	*Built*		*Building*		*Total*	
	Under 1,000 tons	Over 1,000 tons	Under 1,000 tons	Over 1,000 tons	Under 1,000 tons	Over 1,000 tons
Great Britain...	43	9	6	2	49	11
Japan.....	28	00	21	25	49	25
United States...	59	3	35	3	94	6

The United States has urgent need for submarines with long radius, that can operate across either ocean without bases. Our small submarines are useless for that purpose. A large percentage of our submarines are out of commission, due to lack of personnel.

The United States is ahead of her ratio in destroyers, but destroyers cannot take the place of light cruisers or submarines and at the present time about two-thirds of our destroyers are out of commission, due to lack of personnel.

It is difficult to make a direct comparison of personnel with Great Britain for in their estimate they appropriate under fifteen different "votes." In "vote" one, appropriation is made for 88,805 men for the fleet, which does not include a large number of Reservists used constantly on fleet auxiliaries; the Navy's quota of the Air Service; men on shore; men in service under Dominion and Foreign Governments; men in the Colonial Navy. We do not man our Navy in part with Reserves. We include our air force, recruits in training on shore, men at trade schools, recruiting stations and other necessary military activities. On a conservative basis, to place our naval personnel on a substantial parity with that of the British Navy, we should appropriate for about 120,000 men.

Japan has a total enlisted personnel of 65,469 men; if we maintain our 5-3 ratio we require five-thirds times 65,469 or about 109,115 men. We have a total of 86,000 men.

We must modernize our battleships as allowed by the naval treaty,—this has been done by Great Britain. It has been our policy not to spend large sums on modernization but to apply this amount to new construction. Our building program, to be scrapped under the treaty, contained all the latest features.

In time of war all navies are greatly expanded; we must make it an important part of our policy to organize and maintain a sufficient and efficient naval reserve.

SUMMARY

1. The United States made by far the greatest sacrifice in order to establish the principle of Limitation of Armaments by international agreement.

The Conference succeeded only in limiting capital ships and airplane carriers.

Naval strength, although the battleship is the backbone of the fleet, depends also on auxiliary arms of the naval service, such as cruisers, submarines, destroyers and aircraft and most of all on the efficiency of operation, the efficiency and sufficiency of personnel.

We agreed not to establish naval bases in the Western Pacific, thereby reducing our potential power in that locality to a neglible amount.

. Competition has not ceased in the increase of material, its design or in the sufficiency or efficiency of personnel.

2. An adequate Navy is necessary in order that we may exert our influence effectively for the general good; secure and maintain our national policies; protect our own interests; insure our future prosperity; and maintain our security as a nation.

3. The cost of the Navy is approximately two and one-half per cent of the total per capita tax; is very much less than this for those paying little or no income tax, and greater with the increase of income tax and with above average purchases of articles on which luxury and internal revenue taxes are levied.

The cost of the Navy should not be confounded with the cost of past wars, it is an insurance against future wars and the excessive cost and duration of war if come it must.

The cost of the Navy during peace is in great part repaid by its aid to industry and commerce.

4. Our policy under the treaty can be nothing other than maintaining a Navy at least on a parity with Great Britain and at least five-thirds that of Japan, in regular personnel, naval reserves and fighting craft.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

NAVAL MINES

By Lieutenant A. W. Ashbrook, U. S. Navy

The history of the development of mines and the influence they have had on the outcome of practically all great wars since our Revolutionary War is a subject little spoken of in our Navy. Very few of our officers have any definite knowledge concerning the various types we have, the strategic or tactical uses to which they could be put, or to our general mining policy. This lack of knowledge is due to two reasons:

First: Prior to the World War the development of the mine as a weapon was not undertaken to any extent by the great powers; particularly the United States and Great Britain.

Second: When the development of mines was forced upon us by the conditions of the World War, the work was kept not merely confidential but *strictly secret.*

Early History

The mine is not by any means a modern invention, for in the year of 1585, two vessels carrying explosives, fired by clock work, were used to destroy a bridge over the Scheldt River, during the siege of Antwerp. While this was in some sense a mine, it was not until years later that the first idea of the real submarine mine was conceived.

In the year 1775, David Bushnell, of submarine fame, carried out several successful experiments to prove that a charge of gunpowder could be exploded under water, and the birth of the submarine mine can be rightfully reckoned as at this time. Several types of mines were used by this inventor during the Revolutionary War against the British ships off New London and Philadelphia, and while the results were not entirely satisfactory, he succeeded in awaking the interest of Robert Fulton, who took

up mine and submarine work where Bushnell left off. The name of Bushnell has always been associated with the invention of the submarine, but it is little known that this invention was necessitated by his looking for a means of placing a mine in position beneath an enemy's ship.

From 1797 to 1810, Fulton devoted practically his whole time to submarine explosive work and endeavored, in vain however, to have his own government as well as that of France and Great Britain, adopt his inventions for use. Failing to interest the foreign nations in this, he returned home and succeeded in having a commission of high government officials appointed to again consider the adoption of the mine as a part of our National defense system. The way in which Fulton felt concerning mines as weapons of defense is shown by his closing speech before this commission which was:

Gentlemen:

You who feel sensible of the tyranny European navies exercise over us, and the embarrassment under which our government and these states now labor in consequence of such tyranny; You who meditate on the facts of this invention can look forward to the liberty of the seas, when our ships will require no protection against the elements, and find no limits but those of the ocean. I hope you will use your influence to procure the necessary funds for such experiments. On my part I volunteer my services to conducting it; with confidence I promise you the most satisfactory success.

But what, however, may be your decision, whether you now support this system and carry it into effect, or abandon it to the chances of time, I, will never forsake it but with my breath, and I shall hope to see it become the favorite means of protecting the commerce and liberty of my suffering country. Should I sink under the casualties of life, it will be an orphan of the arts which I recommend to the guardianship of my fellow citizens. Let them nourish it with the care which I have watched over it for nine years past, and I predict that their recompense will not only be immense in the economy of blood and treasure, but as lasting as this continent which it will make our own.

From Fulton's last experiment in 1810 to 1842, nothing was done with mines. In 1842, however, Colonel Samuel Colt demonstrated that a mine could be fired by electricity from a distant station, and from this dates the birth of the Controlled Mine.

During the Crimean War, mines were planted by the Russians, but while they exploded in two instances little or no damage was done to the enemy vessels.

The advantages of mines were early recognized by the Confederates during our Civil War, and were used on numerous occasions by them. Their use was not the outcome of any extensive study of the science of mining but was due to their being forced to adopt something to counteract the Union blockade. It was purely a case of "Necessity being the mother of invention." Upon recovery of many of the mines used during this war it was discovered that they were fitted with the same crude types of firing devices as used by Bushnell. Thus it will be seen that after a period of almost one hundred years we did nothing towards the improvement of mines.

The effectiveness of the mines used during the Civil War, even as crude as they were, was remarkable as evidenced by the following results obtained:

UNION FORCES

Vessels striking mines	32
Vessels sunk by mines	27
Vessels sunk by gunfire	9

During the Spanish American War, mines were not used to any extent, but at the outbreak of the Russo-Japanese War both belligerents were equipped to use them. Of the total losses in this war the mine comes in for a very large share of the credit. The Russians lost heavily due to mines, but the Japanese losses from this cause were even greater.

JAPANESE LOSSES DURING THE RUSSO-JAPANESE WAR

Ships	Total No. sunk	No. sunk by mines	No. sunk other causes
Battleships	2	2	
Cruisers	6	5	1 sunk collision
Torpedo Boats	9	4	5 sunk gunfire

NOTE: This table gives only sinkings. Several other vessels were damaged by mines but were not sunk.

Could anything show more clearly the importance of mines than these results; yet little heed did the great powers pay, and in 1914, when the World War started not one of the warring nations was equipped with efficient mines.

MINES DURING THE WORLD WAR

At the outbreak of the World War and for several years previous Great Britain, Italy, and the United States were using the

same type of Naval Defense Mines, that is, the so-called Elia Mine. It was invented by Commander Elia of the Royal Italian Navy, and these three nations accepted this mine without giving it any tests worth mentioning.

It is hard to understand why as progressive a navy as ours could remain so long blind to the importance of mines, both as a defensive and offensive weapon, even after their importance had been brought out in the various wars in which the navies of the world participated.

In 1915, we at last began to realize the worth of mines and a separate force of the Atlantic Fleet was provided, known as the Mine Force. This Force consisted of the U. S. S. *San Francisco*, *Baltimore*, and *Dubuque* equipped as mine layers, four tugs as sweepers and the *Lebanon* as a mine carrier. This was the first real step taken by us in the study of mines and mining. The Mine Force worked hard until our entry into the World War and together with the Bureau of Ordnance, Navy Yard, Norfolk, Va., and the Naval Torpedo Station, Newport, R. I., did much towards the advancement of mining in our navy. All of the early work of our Mine Force was done with the Elia Mines, however, and it was not until after we entered the war with Germany that we turned our attention to the production of new types of mines.

Great Britain discovered about the same time we did, that the Elia Mine was of no use as a weapon and abandoned it. Admiral Viscount Jellicoe, in his book *The Crisis of the Naval War*, puts it very frankly when he says, "Unfortunately, in January, 1917, we did not possess a mine that was satisfactory against submarines. . . . and although we possessed in April, 1917, a stock of 20,000 mines, only 1,500 of them were then fit for laying." Realizing at this late date the inadequacy of their mining material, Great Britain frantically turned to the design and production of a suitable mine. A new model was designed following very closely the mines then in use by Germany, and quantity production was started at once. To this neglect of the science of mining by the British can be attributed, to a marked degree, the success of the German submarine campaign in the first three years of the war. It was not until October, 1917, that any of the new type of British mines, or until June, 1918, that any of the new type of United States mines were planted.

The opinion of the Commander of the U. S. Naval Forces operating in European Waters, as to the importance of mines, is shown by the following extracts from a letter written by him to the Bureau of Ordnance in September, 1918. "Mines are considered by the personnel of the enemy submarines as their most dangerous enemy because they cannot detect their presence. There is hardly any field which offers greater possibilities in the development of means to contain enemy sub-surface craft than mines. I desire to again emphasize the great importance of establishing a mining experimental station, as recommended in my cable,"—"It is my carefully considered opinion that mining is one of the most effective and most promising measures to defeat the enemy sub-surface craft, and that every effort should be made to insure maximum progress."

It is almost impossible to believe that such nations as were engaged in the World War could have neglected the development of mines, until after they had been fighting the Central Powers for several years, particularly since it had been proven that mines had almost unlimited possibilities, both as defensive and offensive weapons, as early as 1777.

Shortly after the entry of the United States in the World War, our Bureau of Ordnance began the development of a suitable mine for anti-submarine use. The result of this work was our present Mk. VI mine which was rapidly designed, experimented with, and produced in large quantities. About 100,000 of these mines were completed; 56,611 of them being planted by the United States Mine Force in the famous North Sea Mine Barrage.

Our Mark VI mine was a distinct forward stride in this line and while it was designed and manufactured with the utmost secrecy as to details of operation, its principle has been given to all of our Allies and information concerning it has been given to the American public through the press. Its range of effectiveness was infinitely greater than mines of previous design due to its having an antennae wire above it, which fired the mine if contact was made on any part of this antennae.

CLASSIFICATION OF SUBMARINE MINES

Since the mine has proven itself to be a most valuable weapon both for defensive and offensive use it might be well to consider

the various classes, the uses for which each are designed, and the various types of vessels fitted for laying them.

Submarine mines are divided into a number of different kinds. The two main classes are:

A. Moored mines.
B. Drifting mines.

Moored mines are subdivided into two classes,

A. Contact mines.
B. Controlled mines.

Drifting mines are subdivided into two classes,

A. Fixed Depth mines.
B. Oscillating mines.

Contact mines, or to be a little more specific, Self Acting mines, are those which are fired when direct contact is made with the mine case or some part of it such as a horn or antennae. This class may be subdivided into three types,

(1) Electrical.
(2) Mechanical.
(3) Electro-Chemical.

In the first of these three types comes the much talked of antennae mine. It consists of a mine having a firing device contained in the mine case above which is suspended an antennae wire. Contact with the mine case or the antennae generates a current sufficient to operate the firing device. A special class of this type carries an antennae both above and below the mine case.

In the second type (mechanical) the firing of the mine is accomplished by a mechanical operation which takes place when the mine case comes in contact with an object.

In the third type (electro-chemical), comes the so-called horn mine. It was this type of mine which was principally used by all countries during the World War except the United States. The mine case carries several horns composed of lead, having glass tubes inside them. These tubes contain an acid which acts as an electrolyte for a battery. Each horn has its battery directly below this glass tube and when contact with the lead horn is made the glass is broken allowing the electrolyte to run into the battery and energize it, thus firing the mine.

Controlled mines are used principally by the army for harbor and coast defenses. They are divided into two types,

1. Moored mines.
2. Ground mines.

Both of these two types have the same arrangements for firing and differ only in the respect of anchors. The moored mines have a regular anchor with the mine case moored to it by means of a wire cable, while the ground mines have the mine case contained in the anchor; that is the whole mine rests directly on the bottom. In order to fire controlled mines a very elaborate system of submarine wiring is required. Three methods of firing are used.

First: By plotting the position of the enemy the mine or mines covering that position are determined and fired by closing a contact switch on shore.

Second: When the enemy makes contact with a mine a signal is made in the observation post and the firing switch for that particular mine is closed, thus firing it.

Third: The firing switches in observation post can be so arranged that when contact is made with a mine it fires itself. In this case the controlled mine becomes practically a contact mine.

The Drifting Mine is the second of the main classes of mines. It is subdivided into two types:

1. Fixed Depth Drifting Mines.
2. Oscillating Mines.

In both of these types the mines are free to drift and once layed, the control of them is lost. In the first of these types (fixed depth), the mine case has a small amount of negative buoyancy, about five pounds, and is supported by a line running to a buoy on the surafce having about ten pounds positive buoyancy. In the second type the mine is made to oscillate between fixed limits of depth but never break surface. It gives no indication of its presence by buoys, etc. In Drifting Mines, firing may be accomplished by the same means as in the Moored Mines, that is, electrical, mechanical, or electro-chemical.

ADVANTAGES AND DISADVANTAGES OF EACH CLASS

MOORED MINES

Advantages:

1. They are inexpensive and readily manufactured.
2. They can be assembled and kept in store ready for use.
3. When issued to mine-layers for laying they require practically no specially trained personnel to lay them.

Disadvantages:

1. May be swept.
2. Not efficient in a current.
3. Are dangerous to own ships when once planted, (except controlled mines).

DRIFTING MINES

Advantages:

1. Of great tactical use particularly in case of a fleet engagement.

Disadvantages:

1. No control over them when once layed.
2. Thrown aside by bow wave of a ship.
3. Short life. (As limited by international agreement.)

The people working with the design of our mine material have, since the World War, endeavored to overcome the disadvantages of mines and at present we have some very promising designs which it is confidently believed will overcome practically all of the present disadvantages. Secrecy forbids giving any further details concerning these designs but at least those who are most interested in this work feel that they have at last developed something which will stand the hardest tests and will be able to score hits against a battle fleet.

TYPES OF MINE LAYERS

An article on the subject of Naval Mines would be incomplete without considering the several types of mining vessels. The so-called mining vessels are:

1. Mine-layers.
2. Light mine-layers.
3. Submarine mine-layers.

4. Mine Sweepers.
5. Mine Carriers.

Mine-layers should be large ships carrying 350 or more mines, and having as much speed as possible, but not less than 25 knots. For a large defensive mine project, where enemy craft are not expected to be encountered, converted merchant vessels make admirable mine-layers for they possess large carrying capacity. Light mine-layers are destroyers fitted to lay mines off enemy ports or drifting mines ahead of an enemy fleet. The World War proved that the most efficient mine-layer was the submarine. Mine sweepers should be developed to sweep at fairly good speed ahead of our fleet when required. Mine carriers may be merchant vessels used to transport mines from distant bases.

PRESENT DAY STATUS OF MINES AND MINING

Being once awakened to the importance of mines we have continued research and development work since the signing of the Armistice and today we have under way some of the most promising designs. For this design and experimental work there is at the Washington Navy Yard a very complete Mine Laboratory.

It is believed that if information concerning the various new types of mines, their uses, etc., could be given to every officer in the navy, great benefits would be obtained. How can we expect the senior officers of our service, the commanders of fleets, or various units of fleets, to be fully prepared to handle their commands in time of war if they have no idea of what to expect from mines? In this connection it is the belief of the writer that our commanders-in-chief at least, and possibly the commanders of control and base forces should have experienced mining officers on their staffs. It is believed that very little is known, not only of our various types of mines, but also of those of an enemy that might be encountered. How many officers of our service realize that it is perfectly feasible to plant moored mines in 500 fathoms of water; or that the paravane no longer renders a ship immune from mines? Lack of this kind of knowledge is not the fault of the individuals but of our own policy of too much secrecy.

After a period of almost 150 years we have at last recognized the importance of the mine as a naval weapon and have taken steps to perfect it. Assuming that our research, experimental and production work will continue, it now behooves us to turn some of our attention towards educating the officers of our Navy in the kinds and uses of mines.

DISCUSSION

Life Insurance as Applied to the Naval Service

(See Whole No. 238, Page 2107)

Lieutenant C. K. Blackburn, U. S. Navy, Retired.—Mr. Webb's article was a very valuable one and one which presented much information of interest to naval personnel. I cannot, however, allow certain statements in his article to pass without taking an opportunity to discuss them.

Although I am an Actuary of a Non-Participating company, I believe the Mutual companies to be acting in good faith and to be making a valuable contribution to Life Insurance as a whole. From Mr. Webb's article one would consider that Non-Participating companies or "Stock Companies," as he calls them, are not acting in good faith and are robbing the insurance policyholder because they do not give dividends.

It is true that a Non-Participating company does not give dividends as such. The Non-Participating contract provides protection at the actual flat basis of safety as determined from previous experience. Non-Participating rates as originally fixed are based on the previous savings on mortality, savings on expenses of operation, and probable future excess earnings on investmnts. Just as a basis of comparison I will quote the rates charged by one of the best Non-Participating companies for the contracts mentioned in Mr. Webb's article:

Non-Participating or "Stock Companies"		*Rates—Mr. Webb's Article*
Straight Life	$15.10	$18.28
Endowment at 60	20.96	24.64
20 Payment Life	22.53	26.48
30 Year Endowment	24.94	28.74
20 Year Endowment	40.51	44.84

The Participating company equalizes the original difference between their rates and those of the Non-Participating company by means of dividends. Such dividends are the earnings for the previous year and are based on the savings on mortality, savings in expenses of operation and excess earnings on investments during that year.

I disagree most thoroughly with Mr. Webb's recommendations for the Straight Life contract as the best form of contract for the naval man. It is true that the actual annual cost to the individual is the least. Premiums under the contract are payable throughout the lifetime of the insured. At no time during the duration of a contract does the cash value increase

between anniversaries by an amount equal to or greater than the premium. The burden of premium payments under the Ordinary Life contract becomes excessive as time passes. A limited Payment Life contract, on the other hand, provides for payments for a certain stated number of years and the insured can count on being relieved of this burden at its conclusion.

The insurance companies of the United States have done their best to equalize commissions on the various forms of contract so that no insured would be urged to take a contract which was not satisfactory to his needs. At the present time the amount of commission received on the different contracts is so very nearly the same that it does not pay an agent to secure an application for a contract which is not fitted to the need of the applicant. Many agents are known to specialize; some on Ordinary Life prospects, some on Limited Life prospects, and still others on Twenty-Year Endowment prospects. If there were a decided inequality in the commissions paid the agent under these forms of contract all agents would try to specialize on the higher premium forms.

I might go on to discuss in general the various forms of contract listed in Mr. Webb's article. No insurance man is capable of knowing which contract is most suitable and most satisfactory for the entire naval service. I remember distinctly that the easiest way for me to save while I was in the service came from certain definite and stated payments for Liberty Bonds. I can well conceive that for certain people an Endowment policy would be equally satisfactory.

The fact remains that each individual must settle what form of contract is most satisfactory for the needs which he desires to provide for. I can only say that I should have too much consideration for my clients to even suggest that a man above thirty-five years of age should take out an Ordinary Life contract. At the younger ages this form of contract is fairly satisfactory. As the age increases its value becomes less.

The Monthly Income contract is very satisfactory if the individual can afford a sufficient amount to give a satisfactory income. The amount of insurance necessary to provide $100 a month for twenty years is about $17,300. Such a monthly income should be the minimum provided. If the individual cannot afford this amount of insurance I am inclined to favor the lump sum method of settlement.

In conclusion I should advise all officers to choose their own insurance forms basing their decision on:

1. Whether they desire to pay for protection their entire lifetime.
2. Whether they desire to pay for protection for a limited period.
3. Whether they desire to pay for protection and savings simultaneously.

If the first is desired, choose an Ordinary Life contract; if the second, a Limited Payment Life contract; and if the third, an Endowment contract.

A Program for Naval History

(SEE WHOLE NO. 232, PAGE 973)

CAPTAIN J. M. SCAMMELL, INF. R. C., U. S. ARMY.—Since I prefer not to go down on the records of the Naval Institute forever as being guilty of "gross ignorance" in an article, or as having been guilty of insulting by wholesale a group of hard-working and sincere officers, may I be permitted to clear up some misunderstandings regarding my article on "A Program for Naval History" which appeared in your June number and upon which Captain Robert H. Woods commented so vigorously in the September issue?

I have made clear my point of view—I believe to his satisfaction—to Captain Woods; I should like similarly to make it clear to your readers.

In the first place, I understand perfectly well that the Rebellion records are not designed to be history, but only material for the use of historians.

I made a very serious error, not in fact, but in rhetoric: I forgot the injunction of Quintilian, that one should write, not so as to be understood, but so that one could not be misunderstood: When I said "One collection bears this notice 'Edited by the clerk of the joint committee on printing,'" I referred, not to the Rebellion records, but to "the manner in which *such things are done* by our government."

In criticizing the editing of the records, I judged the scholarship by present-day standards, and the advance that has been made since the Civil War is enormous. To have done this was, perhaps, unfair. Doubtless in their day the men to whom Captain Woods refers were among the most distinguished of their time.

But none of these considerations affect the actual present-day value of the work. My criticism, however, does not represent my own personal point of view alone. I have heard the undertaking criticized for years. In fact, within the last few days I have noted the following comments:

1. Colonel John R. M. Taylor, U. S. A., in the *American Historical Review:*

"The Rebellion records are not only not history, but they are hardly a model to be followed."

2. Captain Alfred Dewar, R. N., in the *Journal of the Royal United Service Institution,* August, 1921, uses almost the same words:

"Not an example to be followed."

3. The late Professor R. M. Johnston—whose reputation as a judge is secure—in the September-October, 1912, *Infantry Journal:*

"It is perfectly well known among historians that the War Records fail to satisfy the standard in several particulars, and, invaluable though they may be, are a monumental example of how not to spend good money and how not to do a piece of work."

Of course, in attributing the defects to politics I may have jumped at a conclusion that was unwarranted; but at least, it was a perfectly natural one.

Employment and Tactics of Aircraft in Naval Warfare

(SEE PAGE 1263, WHOLE NO. 234)

COMMANDER H. D. COOKE, U. S. NAVY.—1. In the article on the "Employment and Tactics of Aircraft," by Commander J. P. Jackson, the concluding remarks are devoted to the control of operations from the air. The author states that, under proper conditions, a Commander-in-Chief would have a decided advantage in handling a fleet from a dirigible, but that, on account of the vulnerability to airplane attack and the inherent weaknesses in the design of modern airships, a Naval Commander would not be justified in separating himself from his fighting forces.

2. It requires no argument to convince officers who have worked with the game board, or those who have taken part in fleet maneuvers, that a dirigible would afford an ideal position from which to direct the movements of surface craft, providing the weather is clear. While it appears possible to give adequate protection by the use of our own fighting planes, the main difficulty seems to depend upon the questionable ability of such aircraft accompanying the fleet during extended cruises at sea.

3. Commander Jackson also states that, although dirigibles have a large radius of action, they must rely upon a shore base for gas, supplies, and as a place to secure. If this remains true, the future usefulness of this type of aircraft to the fleet will be seriously curtailed. However, although the writer acknowledges a very limited knowledge of aeronautics, the feasibility of towing a dirigible from a surface vessel, to economize fuel and gain a source of supply, does not seem to present insurmountable obstacles.

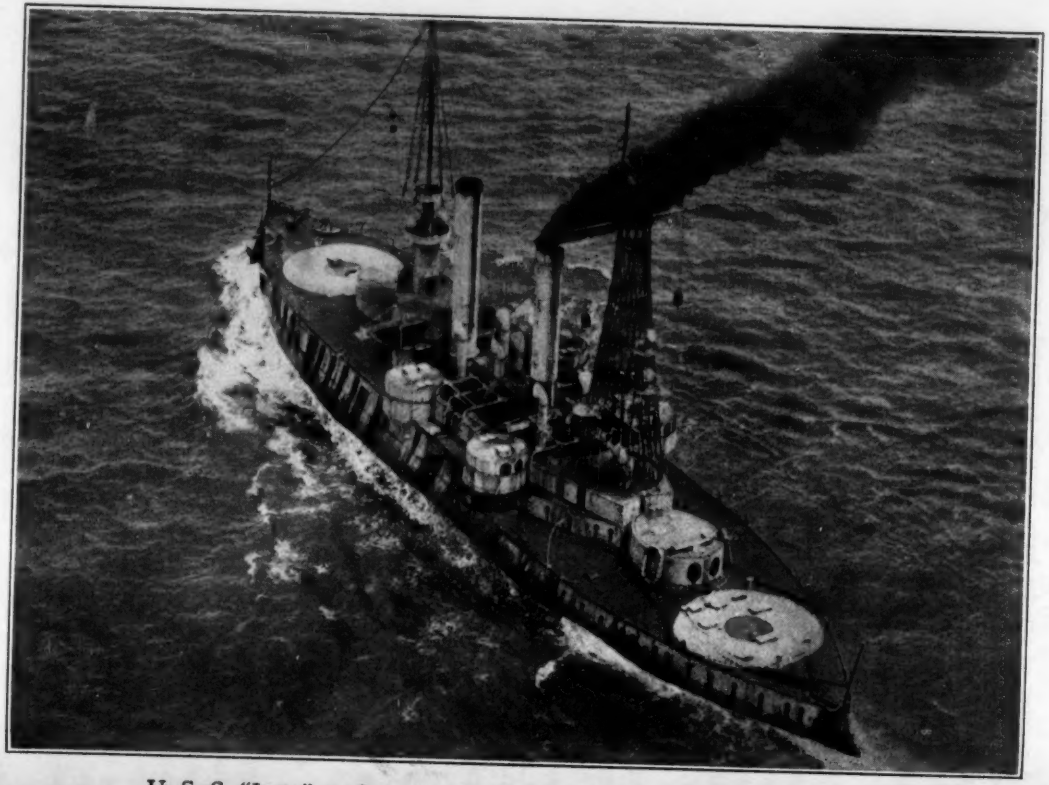
4. If this can be accomplished, under varying weather conditions, it should be no great feat to refuel and replenish a dirigible, as required, from the towing ship, and make her one of the fixed units of the fleet, ready to cast off and operate independently on scouting or other duty. Such an arrangement would require some means of transfer of personnel, but it is believed that this problem can also be satisfactorily solved.

5. With a dirigible attached to his flagship, a Commander-in-Chief could take to the air or not depending upon conditions. If the weather is fine, he should be able to control all of his forces by means of radio communication from a dirigible, free to cruise in any direction, as readily and accurately as could be done on the game board. If, on the other hand, the weather is thick, he would probably elect to remain on his flagship, depending upon an experienced officer of his staff to cruise over the battle area and give what information he can obtain of the disposition of forces and progress of the engagement.

6. Considering a helium filled dirigible, and a number of fighting planes acting as an aerial defense, in addition to the anti-aircraft guns of the fleet, it appears that an airship of this type could be made reasonably safe for the Commander-in-Chief during battle. Even should the experiment prove hazardous, would not the probable initial advantage gained, which is

all important in naval battles, more than offset the disadvantage of placing the Commander-in-Chief in jeopardy during the later stages of the engagement?

7. A number of articles have recently appeared recommending various locations for the Commander-in-Chief in battle. These remarks are, therefore, submitted as an argument for an aerial flagship, in a belief that future development will result in surface fleets being controlled largely, if not entirely, from the air.



U. S. S. "IOWA" AS SHE APPEARS TODAY, EQUIPPED FOR RADIO CONTROL
The *Iowa* will be used as a target by the fleet in the Bay of Panama about March 26, 1923.
(NOTE.—Comparison of this photograph with that of the U. S. S. *California*, the frontis-
piece of this issue, will prove interesting. Both were taken from the

PROFESSIONAL NOTES

PREPARED BY

LIEUTENANT COMMANDER F. W. ROCKWELL, U. S. NAVY

and

LIEUTENANT J. B. HEFFERNAN, U. S. NAVY

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GREAT BRITAIN

HAVE WE ENOUGH SUBMARINES?—"Submarines were the first at sea on the outbreak of war, they have been continuously in action while it lasted, they will be the last to return to harbor. You have, in addition to the invaluable outpost, patrol, mine-laying, fleet duties, and other services, the sinking of fifty-four enemy warships and 274 other vessels to your credit, and you have done more to counter the enemy's illegal war upon commerce than any other means. . . ." These extracts from the message addressed after the armistice to all boats by the then Commodore of Submarines—now Rear Admiral S. S. Hall—should be quite sufficient to dispose of the idea, which many people still entertain, that our submarine service played a negligible rôle in the Great War. They serve also to correct the equally fallacious assumption that the underwater boat will be more or less useless to the British Navy in its future work. This wrong impression was unfortunately conveyed to the public by certain speeches of the British delegates at the Washington Conference, when they were attempting to secure the total abolition of the submarine. But naval men and all who have studied the history of the Great War are well aware that our submarines not only rendered magnificent service to the Allied cause, but that they are certain to prove of still greater value if we ever have to fight at sea again. Because the Germans employed their *U*-boats almost exclusively for commerce destruction it has been hastily assumed that the submarine is good for little else. The publication of the recent Admiralty memorandum to New Zealand on naval policy, in which the building of submarines was urged upon that Dominion, has therefore caused some surprise, and people have been asking why the Admiralty should recommend the construction of vessels which they had

The *Iowa* will be used as a target by the fleet in the Bay of Panama about March 26, 1923. (NOTE.—Comparison of this photograph with that of the U. S. S. *California*, the frontis-

previously declared to be valueless for British naval purposes. The answer is, of course, that the Admiralty made no such declaration, that the speeches at Washington, in which the submarine was branded as a murderous weapon, only useful for illegitimate methods of warfare, were delivered by laymen who spoke without technical knowledge of the subject, and certainly without the inspiration of their naval advisers.

Apart from its value as a tactical unit operating against the surface warships of an enemy, the submarine has demonstrated its high efficiency for reconnaissance, patrol, escort, and counter-submarine work, so much so that in any future war in which our communications were seriously threatened there would be an urgent demand for many more boats than would probably be available. To carry out effectively the duties we have mentioned, good sea-keeping qualities and wide radius of action are essential for which reason the trend of development is toward larger displacement and improved habitability. Our boats of the *L* class appear to represent the smallest type which could be usefully employed on the ocean-going duties likely to devolve upon British submarines in future wars. The small coastal boat which enjoyed such a vogue some years ago is now obsolete so far as we are concerned, for it has come to be recognized that our submarines, like other ships of the King's Navy, must be prepared to do their work in all waters and not be tied to their home coasts. Accordingly, scores of our smaller boats have been scrapped, and in the interests of economy many others of ocean-going dimensions have been discarded. As the gaps thus left have not been filled by new construction our submarine fleet is now comparatively weak. At the close of the financial year there will remain only fifty-eight boats, including eighteen in reserve. There are, besides, six boats in Australia, all of which are out of commission. The two small submarines of the Canadian Navy are understood to have been placed on the disposal list.

At the date of the armistice we had seventy-three submarines under construction, of which number thirty-three were cancelled forthwith. The United States and Japan also had big programs in hand, but they did not follow our example. The result is that while both Powers have been steadily building up their submarine fleets since the war, we have been steadily reducing ours. During the past four years the United States has authorized or laid down thirty-three boats, Japan has begun at least thirty-five boats and authorized twenty-four more, and Great Britain has authorized and laid down one boat. Consequently, when the various programs have matured, we shall have only one submarine that fully embodies the technical improvements suggested by war experience, while the United States will have thirty-three and Japan fifty-nine. Numerically the United States is now the leading Power as regards submarines, for she has 124 boats built and building, exclusive of twenty-two obsolete craft which have recently been condemned for scrapping, and fifty-six of her boats are suitable for long-range work. Of the British total of sixty-four (including the six Australian boats), about forty belong to the genuine ocean-going type. Japan is particularly strong in submarines of this type, as eventually she will have between sixty and seventy boats with cruising radius of 5,000 to 12,000 miles. These figures suggest that if the submarine is as valuable for general naval purposes as most experts believe it to be, our underwater fleet needs to be reinforced without delay. It is true there is some vague talk across the Atlantic of summoning a second conference to restrict the output of submarine tonnage, but there is no reason to suppose that a second attempt to achieve this object would prove more successful than the first.—*Naval and Military Record,* 8 November, 1922.

LABOR AND DEFENSE.—It is not easy to forecast the influence which the presence of a strong Labor bloc in the House of Commons will exercise on defense policy. Ever since the Labor party became a political factor to be reckoned with it has leaned toward pacifism, and, with rare exceptions, opposed the provision of adequate national armaments. Some years ago, indeed, Mr. Arthur Henderson declared on a public platform that "the Labor party was the 'little Navy' party, and was not ashamed of the nickname." But we doubt whether Mr. Henderson would have had the courage to repeat that confession in the early months of the war, when only the British Navy stood between the Kaiser's legions and the dominion of the world. Labor hitherto has opposed armaments on two grounds—first, because they are a menace to democracy, and, secondly, because they fill the pockets of the capitalists.

Both reasons, however, are fallacious—in this country at any rate, whatever may be the case elsewhere. To assert that the British Navy or Army has ever been used to suppress or hamper the legitimate aspirations of any section of the people is to assert what is demonstrably false. On the contrary, British arms have repeatedly been employed to defend the liberties of the people, and without them the world today would unquestionably be under the iron rule of a military despotism. With regard to the charge that armaments are only profitable to those who manufacture them, we have the *obiter dicta* of Mr. R. B. Cunninghame Graham, one of the Socialist "intellectuals," who once wrote in the *Saturday Review* as follows: "After all, what is a Dreadnaught but a swagship, whether in England or in Germany? Swag in the contract, swag in the material of which the ship is built, in every link of the chain-cable; swag from truck to keel. Build eight, build ten, build twenty Dreadnaughts, whether at Portsmouth or at Kiel; the object of their building will be swag."

It is curious that those who claim to be selfless idealists should generally be the first to impute dishonest motives to their fellow men. Before committing himself to the statement quoted above, Mr. Graham might have taken the trouble to explore the economics of the question. Had he done so he would have found that there is less money in warship construction than in any other branch of shipbuilding. He would have found, too, that an overwhelming proportion of a warship's cost is paid out in wages. If, therefore, such vessels are built for swag, a goodly portion of it is shared by the workers themselves. Mr. Graham would also find food for thought in the present attitude of the Labor party toward the new battleship program and naval policy in general.

We venture to say that no party has been more insistent than Labor in encouraging, both by direct and indirect political pressure, the building of these two new ships or in resisting such measures of retrenchment as the closing of superfluous establishments and the reduction of dockyard and arsenal staffs. Have its motives in this case been altogether free from the mercenary taint? For our part we do not think that Labor control in this country would necessarily involve the neglect of national defense. The rank and file of the party have often shown a sounder grasp of realities than their leaders. It was the masses who in the critical years before the war insisted on the Navy being kept strong enough to face the German fleet, when the political chiefs of more than one party were inclined to wobble. Let any visible menace confront Britain and the workers will always be found rallying round the old flag, which, as they well know, is still the emblem of the world's truest and greatest democracy.—*Naval and Military Record*, 22 November, 1922.

ARMY AND NAVY EFFICIENCY.—Dealing with the importance of being prepared for sudden emergencies, such as arose out of the Near Eastern crisis a few weeks ago, one of the London papers argues that, although our fighting forces have been much reduced, they are far more powerful and efficient in proportion to their paper strength than was the case before the Great War. This assertion may pass with the general public, but it is likely to be challenged by service men. That the Army of today can develop more offensive power per unit than was possible eight years ago is true enough, this being the result of improvements in material, but so far as personnel is concerned a great majority of our troops have not yet served sufficiently long to acquire that degree of training and that superb discipline which made the "Old Contemptibles" so formidable in the field.

As for the Navy, our modern ships are, of course, better armed and better equipped in every way than their predecessors of 1914, but that the fleet as a whole is more efficient now than then is open to doubt. Large numbers of the most experienced officers and men have left the service; the economy program, by reducing the number of ships in full commission and cutting down the fuel allowance, has made it impossible to carry out fleet exercises and training on anything like the pre-war scale, so that the all-round efficiency of the fleet as a tactical unit has inevitably suffered some decline. Even the fully-commissioned ships, if not actually short-handed, have complements much smaller than war experience indicated as necessary, and those of the Atlantic Fleet carry a large proportion of boys and seamen who are still in the early stage of their training. The same conditions obtain to a greater or less degree in the United States Navy, where, indeed, the percentage of "green" ratings is understood to be considerably higher than in our service. The only navy which probably shows an absolute gain in general efficiency as compared with the pre-war standard is that of Japan, where there has been no great exodus of trained officers and men, where war lessons have been embodied in material and equipment, and where exercises of every description are carried out on a larger scale than was customary before the war.—*Naval and Military Record,* 8 November, 1922.

SUBMARINE SERVICE.—The Admiralty have just notified a number of amendments to King's Regulations and Admiralty Instructions. One of these announcements states the junior officers for the Submarine Service will be selected from sub-lieutenants and junior lieutenants who volunteer.

Applications to specialize in submarines, it is notified, should be accompanied by a certificate from the medical officer of the candidate's ship, stating that he is physically fit for such service. The applications should be forwarded to the Admiralty, through the usual official channels, duplicate copy being sent to the Rear-Admiral (S.) Sub-lieutenants who have not obtained their watchkeeping certificates prior to joining the Submarine Service may obtain them in that Service.

A larger proportion of junior officers is required in the Submarine Service than of more senior lieutenants and lieutenant-commanders. In consequence, the appointments of junior officers to submarines will be for three years in the first instance, after which they will return either temporarily or permanently to the general service. Before returning to general service the officers will be eligible to volunteer to specialize in submarines, gunnery, torpedo, navigation, etc. Those who volunteer and are selected for submarines will be definitely earmarked for that service, and after one year in the general service will return to the Submarine Service, and from that time will be regarded as specialists in that service and will only revert to the general service under the same conditions as

other specialists: viz., in consequence of promotion, at own request, for unsuitability, medical unfitness, misconduct, or lack of suitable submarine appointment owing to age and seniority.

On attaining about eight years' seniority as lieutenants, submarine specialists will be sent to seagoing ships for general service experience for a period of approximately two years, afterward returning to the Submarine Service.

Submarine specialists will receive equal consideration with other specialists in regard to promotion.

Service in submarines in the junior ranks provides excellent training for officers who ultimately desire to specialize, and is a good preparation for service in destroyers on return to the general service.

Allowances are payable for service in submarines on the scale laid down in Art. 1372.—*Naval and Military Record*, 29 November, 1922.

BUILDING FOR FOREIGN NAVIES.—The fact that Brazil is to have her fleet reorganized by a naval mission from the United States has given rise in some quarters here to gloomy talk about the waning of British prestige among the smaller maritime States, most of whom used to come to us for assistance whenever they wished to develop their naval power. It must not be forgotten, however, that the growth of American influence in Brazilian naval circles dates back to the days of the war, when the preoccupation of Great Britain with her struggle for existence left her no time to think about her future interests in South America. In 1917 the Brazilian Government decided to have the battleship *Sao Paulo* thoroughly overhauled, and as it was impossible, for obvious reasons, to get the work done in Europe, the vessel was sent to New York Navy Yard. Two years later the Washington naval authorities invited Brazil to send this ship to exercise with their Atlantic Fleet, and, as the invitation was accepted, it was only natural that certain Brazilian officers should become permeated with American ideas.

A sister ship, the *Minas Geraes*, was also refitted at New York at a cost reported to be as high as £2,000,000. It is probable that other units of the fleet will be similarly treated, though British firms are still hopeful of securing the contract for modernizing the cruisers *Bahia* and *Rio Grande do Sul*. That the presence of Admiral Vogelsang and other United States Officers at Brazilian naval headquarters will bring any lucrative orders to American shipbuilders is by no means certain. So far as is known, Brazil's new naval program is limited to a few submarines, the reconstruction of old ships, and the extension of base facilities. No new ships of large size are contemplated at present.

Should any of the smaller naval Powers decide to order new ships, there will be very keen competition for the work between British and American firms. There is nothing to show that current shipbuilding costs in the United States are lower than those prevailing here, and the old British reputation for good workmanship has certainly survived the war. Prices have probably come down a little since last year, when it was reported that an order for two large Japanese cruisers had been lost owing to the fact that the lowest British tender was appreciably higher than the average price quoted by Japanese firms.

It is a long time since the last foreign naval contract found its way to this country, though in pre-war days our yards were rarely, if ever, without such work. For example, on the outbreak of war we had the following orders in hand: For Chile, two battleships of 28,000 tons and three large destroyers; for Turkey, two battleships of 27,500 and 23,000 tons, four large destroyers, and several patrol craft; for Norway, two coastal ironclads of 4,900 tons; for Greece, two light cruisers of 5,250

tons; for Brazil, three river monitors of 1,200 tons. There were, besides, torpedo craft on the stocks for Japan and Portugal, and other foreign contracts were known to be impending.

All the vessels enumerated were requisitioned by the Admiralty, and thus made a powerful reinforcement for our own fleet. The construction of warships to foreign account is a branch of work which has always been particularly welcome to our shipbuilders, who have found it more profitable than Admiralty contracts. It is to be feared, however, that little will be doing in this line for some years to come, since most of the States now increasing their navies are able to do so from their own resources.—*Naval and Military Record*, 29 November, 1922.

CRIPPLED FLEETS.—A striking example of the evil results that attend indiscriminate retrenchment in the sphere of defense comes from the United States, where the Navy, according to statements appearing in responsible American journals, has been well-nigh crippled by the drastic reduction of personnel. We reproduced last week an article from the *Scientific American*, which contained some sensational facts bearing on this subject, and there is every reason to believe them authoritative. They point a moral which our own too-zealous economists should take to heart. Nearly a year ago the anti-waste party in Congress tried to cut down the number of seamen in the Navy to 67,000. This attempt was not altogether successful, but in spite of assurances by naval experts, supported by incontrovertible evidence, that 96,000 was the smallest number of men required to maintain the fleet at a degree of efficiency characterized as only "fair," Congress refused to appropriate for more than 86,000. What has been the result? If the American Fleet were called upon to engage an enemy tomorrow, it would go into action with reduced complements. Of trained gun numbers each ship has only enough to man one broadside, so that, although the main armament might be fully effective, half the secondary guns would be silent. Even with most of the guns in action, however, their rate of fire would be slow, as there are not sufficient men available to keep the ammunition supply up to the maximum necessary for sustained rapid fire. Thus the fleet would be handicapped in a most vital respect, for, once battle has been joined, the issue is mainly dependent on gunnery. Speed, another supremely important factor in war, is also affected by the shortage of personnel, for if the gun crews and ammunition parties were to be reinforced in order to keep the armament fairly in action, the men in the engineering department would be so reduced that full speed could be maintained for no longer than two watches. The continuous speed of the battle fleet would fall from twenty knots to ten, and that of the destroyers from thirty-five knots to fifteen.

This would be serious enough in any circumstances, but considering that the American Fleet, if it has to fight at all in the near future, will fight in the Pacific, where the distances are immense and the strategical conditions such that long periods of steaming at full speed would have to be undertaken by all units of the fleet, inability to do this might well prove disastrous. Even under peace conditions the dearth of men is gravely hampering training and exercises. Ships are unable to remain at sea as long as formerly; target practice has had to be curtailed, and the whole organization on board suffers from the frequent withdrawal of men from one duty to perform another. It would appear that Congress has also cut down the appropriations for fuel, practice ammunition, and other supplies essential to the proper conduct of fleet training. Added to these drawbacks is the well-known fact that most of the men leave the service as soon as their first term of enlistment is up, preferring

to take their chance in civilian life rather than make a career of a service the future of which, owing to the shortsighted economy of the legislative bodies, is uncertain and unpromising. The Navy Department, which has meanwhile brought its administrative and operating costs down to the lowest figure possible, is now asking for a seaman personnel of 96,000 as the absolute minimum consistent with the maintenance of the fleet at a reasonable plane of efficiency. Unless the proposed increase of 10,000 men is sanctioned it will be impossible, according to expert opinion, to keep the United States Navy up to the level of power prescribed by the Limitation Treaty, and its actual fighting strength would then be little, if at all, superior to that of the Japanese Navy.

It would be instructive to have an equally frank exposition of the existing state of affairs in our own Navy. We have fewer battleships in commission than the United States, and our destroyer and submarine flotillas are also smaller; but against this we are maintaining a greater number of ships on foreign stations. In the Atlantic Fleet the complements of ships are now 15.7 less than war experience showed to be desirable; and a large percentage consists of ratings still in the early stage of training. The Mediterranean Fleet is also working with reduced complements, and the same is true to a greater or lesser degree of every other unit in commission. It is, therefore, probable that our Navy as a whole has to contend with much the same difficulties as those which beset the American Fleet. The scrapping of ships condemned under the Limitation Treaty will make very little difference to personnel requirements, most of these vessels having already been paid off. The establishment, which in 1918-19 stood at 381,311, will have been reduced at the end of this financial year to 98,500, a total that includes Royal Marines, Coastguard, boys under training, and naval cadets, so that the net total available for manning is considerably smaller. The American establishment, on the other hand, includes 86,000 "enlisted men," all available for manning, and does not include the Marine Corps, which has an authorized strength of 20,000. Thus, even if the American naval personnel is not increased, it will still remain larger than ours, and our Navy has consequently fallen below that One-Power Standard which we are supposed to be maintaining.—*Naval and Military Record*, 29 November, 1922.

FRANCE

THE FRENCH ARSENALS.—The debate in the Chamber of Deputies upon the reorganization of the arsenals, whereby it is hoped to realize economies of thirty to thirty-five million francs a year, has enabled the Minister of Marine to explain the policy of the Government, which aims at concentrating effort upon the two leading arsenals and utilizing the others in association with private shipyards, so that they may be readily organized in time of war. The idea of handing the arsenals of Lorient and Rochefort over to private firms has been abandoned for the time being through the failure to obtain suitable offers. The arsenals that are to be kept in a high state of efficiency are Brest and Toulon. Cherbourg and Bizerte will become naval bases, and the other arsenals will be regarded as auxiliaries which will be just kept going so that they may be utilized in time of hostilities. The slips for the construction of submarines will be maintained at Cherbourg, and the number of hands at Bizerte will be reduced to what it was before the war, while at Lorient it is intended to make more profitable use of the high-class plant and machinery with which the port is equipped. Rochefort will be suppressed and the Guérigny armor plate and chain works, which have been closed down since 1919, will be made over to private enterprise if an acceptable offer is forthcoming. No more armor plates will be required, as the 8,000-ton cruisers

under the new program will be built for speed and will have no protection, and the chain manufacture will be transferred to Indret. In a word, the State has no longer the intention of running the arsenals in competition with private industry, but, except in the case of Brest and Toulon, will use them mainly for repairs and other work, and also for organizing the private industry in time of war.—*The Engineer,* 1 December, 1922.

PRESENT FRENCH NAVAL POWER.—The loss of the battleship *France* has called public attention to the present position of the French naval power, which is declared to be comparatively lower than it has ever been since the beginning of the last century.

Leaving out of account certain units which are now out of date and are retained only on account of French naval poverty, the French Navy is reduced to six dreadnaughts, five light ex-enemy cruisers, thirty-eight torpedo-boat destroyers, of which ten are ex-enemy, and forty-one submarines, of which ten are ex-German. For the rest, there are three battleships of the *Voltaire* type (18,300 tons), ten old armored cruisers of the *Montcalm-Michelet-Quinet* type, a dozen old torpedo-boat destroyers, and an equal number of antiquated submarines.

Moreover, coast defense against an enemy at sea is said to be nonexistent, since the old heavy batteries scattered along the coast line have a range of scarcely more than 6¼ miles, while the guns of a modern battleship carry from 20 to 25 kilometers (12½ to 15½ miles). Again, the position of French naval aviation is far from satisfactory, since the greater part of the seaplanes constructed during the war are no longer serviceable, and Parliament has not yet voted the credit for their renewal.

Frenchmen are, indeed, asking themselves whether it would be possible to protect their maritime communications in the event of a renewed conflict with Germany, and the present state of the French Navy is compared unfavorably with that of Italy. The taxpayer is therefore called upon to face the situation courageously and make the sacrifices necessary to re-establish French naval power on a satisfactory basis.—J. B. H.

FRANCE DELAYS RATIFICATION OF NAVY PACT.—Paris, December 2.—Hostility toward the ratification of the Washington naval agreements in the Foreign Affairs Committee of the French Chamber of Deputies, placing Georges Mandel, reporter of the commission, on the minority side, was responsible for the resignation of M. Mandel, former chief of Cabinet under Clemenceau, from the commission.

While M. Mandel himself refuses to be quoted as to the circumstances leading to his resignation, it is known that the committee rejected his report, recommending ratification by a vote of twenty-six to sixteen, with two members absent.

Premier Poincaré and Ex-Premier Briand were among the minority which favored immediate action on the Washington treaties.

The refusal of the commission to recommend unqualified ratification of the Washington treaties is not interpreted in parliamentary circles as involving disapproval of the principle of the agreement. It is looked upon as a question of interior policy which will be taken advantage of in an attempt to defeat former Premier Leygues as president of the Foreign Affairs Commission when officers are re-elected next January.

As matters now stand, it seems probable to parliamentary circles that there will be a majority in the commission favorable to ratification with a reservation allowing France full freedom of action in building capital

ships "as the necessity to protect the French colonies may demand."—*Baltimore Sun*, 3 December, 1922.

FRENCH NAVY NOTES.—The brisk training at sea both in the North and in the Mediterranean, the initiative and pushfulness of Sea-front Commanders Schwerer and Barthes, who are trying hard to transform their landlubbers' jobs into active sea duties, are the only gratifying items in the naval situation. Stagnation and inertia prevail both in Parliament and at Rue Royale. Bolshevist deputés, though they vote against Army and Navy expenditure, are allowed to pour at length indignation and tears over the intended (for the last thirty years) suppression of State arsenals and of arsenal workmen, but this will not prevent Frenchmen claiming that they are *le pays du bon sens*. Admirals, of whom there are nearly three dozen on shore and eight at sea, are extremely busy piling reforms upon reforms and discussing momentous naval matters; and the Ecole Navale at Brest is celebrating its *triomphe* and sailing in reconstituted vessels of ancient architecture of those times when the French Navy was, with the English, supreme on the water.

The laying down of two British 35,000-ton battleships (that will in reality be 40,000-ton mastodons at full load), whilst exciting not the least bit of envy or anxiety, is nevertheless giving rise to interested comments in naval circles, as it throws a light on the true opinion of the London Admiralty as to the actual fighting value of the battleship. Paris constructors, who studied the methods and achievements of Sir E. H. T. d'Eyncourt in the mighty *Hood* and other bulge ships, and who, besides, have conducted experiments of their own, have arrived at the conclusion that British constructors have come much nearer to the solution of the problem of battleship insubmersibility, all the more so as the great comedown in speed, from 32 knots in the *Hood* to 23 knots in the new ships, shows that defense will absorb an unprecedented share of the total displacement. They also believe that the new British super-Dreadnaughts will mark a new departure in the distribution of armor, to be very thick on decks and to sink very low under the waterline, so as to afford protection against aerial bombs and torpedoes as well as against oblique hits. It will be a reminder of the ideas that presided thirty years ago over the designing of the Italian *Italia* and *Lepanto*. With the exception of the *Hood*, British mastodons in project will outclass all the exceedingly vulnerable (to bombs and aerial torpedoes) Dreadnaughts and super-Dreadnaughts of today. Britain leads.

The recent tempest in the Channel gave rise to useful lessons from a naval standpoint. German-made destroyers, though they have many good points on paper and are more powerfully armed than French types of similar tonnage are decidedly inferior in sea-keeping qualities and all-round robustness, and are far from having been as carefully designed in regard to stability and buoyancy and comfort on board. They are top-heavy, and dangerously so when fuel supply is getting low, while having insufficient freeboard amidships and aft. And yet with their high, robust bows they cannot be termed fair-weather boats, but the right description of them is that they are more military, more gun platforms, than naval seagoing craft. They were designed and built hastily with a view to short operations in the North Sea, and to short life; and the more they are tested and examined, the more regret is felt at the amount of time and money wasted in patching them up for prolonged service in the French Navy. And the same is true of German submarines, they too hastily built for short war service. When the breakdown in the Channel of the 280-ton *Morillot* is examined, another lesson is to be derived: namely, that French officers and crews are not quite at home in enemy quarters.

In truth, the comparative experience the French Navy has gained with German-built torpedo craft will have been of greater value to the constructor than to the seaman; its benefit will be felt a few years hence, when the eighteen destroyers of 2,500 and 1,425 tons just ordered will enter the service. The test of the real thing, especially in the Adriatic, though it is a narrow sea, has made it clear to our admirals that the twenty *contre-torpilleurs* of 800 to 900 tons, built before the war, though carefully designed and built and excellent for coastal duties, are little more than make-believe instruments de combat for high sea warfare. Admirals de Lapeyrère and Dartige du Fournet had no end of disappointment with their destroyers, robust enough so far as the hull is concerned, but with delicate and fragile motors, unequal to the wear and tear of prolonged war service. At one time Admiral Dartige du Fournet complained of only having two destroyers on which he could rely; and several units, of which *La Faulx* of 800 tons and 33 knots, (rammed by the *Mangini*), were lost as the result of sudden breakdowns. Hence, the after-war demand for larger and stronger *contre-torpilleurs*, made not for show and for paper utilization of the displacement, but for rough ocean work. The 1,425-ton *torpilleurs d'escadre* now building, are only designed for 32 knots, but they will have cruiser standard of constructional strength in all vital respects, as the result of recent progress in the manufacturing of high tensile steel, while carrying at good elevation a light cruiser armament of four 5.1-inch guns. They mark, and the 2,500-ton *contre-torpilleurs* still more so, a considerable advance in destroyer construction, and they will by 1925 cause France to regain the lead over Italy for that class of vessels, at least if the revolutionary Italian Government does not proceed with its rumored plans of naval extension.

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The comprehensive lesson of the *Goeben* and *Breslau* affair is the one the French Navy has taken most at heart. It demonstrated the superlative strategic value of speed: the results of that demonstration are embodied in the 8,000-ton and 34-knot cruisers now building, as well as in the 36-knot destroyers of 2,500 tons. The value of coastal points *d'appui*, shown by what Bizerta could have done and did not do, is at the root of the actual much-criticized coastal organization and of the coastal maneuvers that are *à l'ordre du jour* in France, both in the Channel and in the Mediterranean. Unlike his predecessors, our present Commander-in-Chief dislikes having his cruisers and destroyers tied to his battleships, well aware that his armored force is best defended against mosquito attack by an extended screen of small unit commanders utilizing their full initiative with a view to hunting down and destroying the enemy. Hence the many independent cruises by destroyer and submarine groups in the Mediterranean. Not to literally and blindly obey orders, but to destroy the enemy is the rule, and it was the Nelson rule. It is not the letter that matters, but the spirit.—J. B. Goutreau in the *Naval and Military Record*, 15 and 22 November, 1922.

GERMANY

THE GERMAN NAVAL ANNUAL.—While in England the leading work of reference for sea affairs, *Brassey's Naval Annual*, kept going except in the years 1917–18, the corresponding volume in Germany, *Nauticus*, has not appeared since 1914. It is therefore interesting to learn that a new issue is promised in April, 1923, the seventeenth. The former volumes of *Nauticus* were issued under the auspices of the German Navy Office, and came under the direct inspiration of Admiral von Tirpitz, whose personality was supposed to be covered by the pseudonym of

"Nauticus." The 1914 edition had a political and international survey, records of the German and other Navies, chapters on ordnance, mining, armed merchantmen, the military and legal aspects of blockade, shipbuilding and the mercantile marine, with many statistics. The Navy Office (*Reichsmarine-amt*), within which the book was edited up to the outbreak of war, no longer exists under the same name, and what authority the new *Nauticus* will possess does not seem to have been announced. It will presumably be more largely concerned with the mercantile marine and the economic conditions of oversea trade.—*Army, Navy, and Air Force Gazette*, 18 November, 1922.

WHAT AND HOW GERMANY HAS PAID TO DATE.—A statement of just what Germany has paid to date in reparations and the medium in which the payments have been made is of peculiar interest just now in view of reparations situation. The London *Stock Exchange Gazette*, using official figures, estimates that Germany had paid up to the end of March, 9,511,943,119 marks gold in reparations and restitutions in kind, a sum equivalent to about $2,800,000,000, at the pre-war rate of exchange. The London authority adds that:

At first sight this sum seems large indeed. However, about three-fourths of the amount mentioned consists of objects of value taken from France and Belgium by the German invaders and returned as restitution to the legitimate owners.

The reparations payments proper come to 1,321,641,102 marks gold, or £66,000,000, according to the following statement:

	Marks
Coal	987,619,017
Cattle	171,816,756
Dyestuffs	49,353,864
Coal by-products	21,552,479
Pictures for Belgium	12,000,000
Drugs	11,558,641
Louvain Library	1,052,200
Various	66,688,145
Total	1,321,641,102

It should be added that the 5,000 locomotives and the 150,000 railway wagons delivered under the Armistice represent 1,100,000,000 marks gold.—*The Literary Digest*, 18 November, 1922.

UNITED STATES

THE LARGEST CRUISING AIRDROME.—When the Disarmament Conference met a year ago in Washington, six battle cruisers, which would have been the largest and fastest of their type afloat, were under construction in various yards, private and governmental, throughout the United States. The keels of all six had been laid and some of them considerably advanced in construction, the degree of completion varying from three per cent to about thirty per cent. The amended designs in accordance with which they were being built, called for a length over all of 874 feet, a beam of about 104 feet, a draft of 31 feet, and a displacement of 43,500 tons. They were to mount eight 50-caliber, 16-inch guns in the main battery and sixteen 6-inch guns in the anti-torpedo battery. The most remarkable feature in these ships was the motive power, which was to employ the electric drive and develop 180,000 horsepower upon four

shafts, and give these ships a speed of 33¼ knots. Built as thus designed, they would have been exceedingly handsome vessels, with two cage masts between which there would have been two large elliptical funnels.

It will be remembered that the most sweeping reduction made at the conference occurred among the capital ships—battleships and battle cruisers—which were under construction when the conference convened. Among the ships that were at first eliminated were the six battle cruisers; but, subsequently, among the modifications which were made in the first plans, was one permitting both the United States and Japan each to complete two of their battle cruisers as aircraft carriers. A limitation of a maximum displacement of 35,000 tons was placed on the size of such vessels; a maximum total of 70,000 tons being allowed to any navy for vessels of this type.

Our naval authorities decided to complete as aircraft carriers the two battle cruisers which were most advanced in construction. These were the *Lexington,* building at the yards of the Bethlehem Shipbuilding Corporation, at Fore River, Mass., and the *Saratoga,* which was being built by the New York Shipbuilding Corporation at Camden, N. J., the *Lexington* being at that time 26.7 per cent completed, and the *Saratoga* 29.4 per cent.

Now to those of us who have studied the drawings of these battle cruisers, which were published in the *Scientific American* from time to time, it will be evident that the main hull structure will not be very greatly altered, at least, in its outboard profile. There will be no change in the form of the hull below water, and the changes in the upper structure will be such as are necessitated by the new positions of the 6-inch gun battery, and the provision of the necessary airports, and the openings for the stowage of boats.

The *sine qua non* of an aircraft carrier is the provision of a broad and long flush deck—the longer and the broader the better—extending from stem to stern, and from side to side, with the least possible amount of obstruction. Consequently, in looking at the *Lexington* in its reconstructed form* we see that the four turrets with their eight 16-inch guns have been swept away, together with the whole of the superstructure between them. The two centrally placed masts and the two funnels have also disappeared. In their place we see a single cage mast with abaft of it a huge elliptical funnel, erected on the starboard side of the ship and a little forward of her mid-length. Forward of the military mast is a low conning tower between which and the base of the mast is a chart room. Aft of the smokestack is a deck house for the use of the navigating officers, the officers of the watch, etc. At the forward and after end of these structures is a single derrick for hoisting aircraft from the water. Above the conning tower is a range-finder, and a fore and aft bridge extends from the conning tower around the mast to the after end of the smokestack. A ladder leads from this bridge up to a platform which encircles the smokestack, and carries at each of its corners a high-powered searchlight. The top of the cage mast finishes in an enclosed fire-control platform, and to the rear of this is erected a steel pole mast from which the wireless antennae extend forward and aft, down to suitable connections at the deck. It should be noted that the smokestack serves to enclose five separate uptakes from the boiler rooms.

The after half of the upper deck is used as a flying-on deck for the landing of airplanes, and to assist in bringing them to a standstill after landing at the stern and running forward for some 200 feet, they pass on to a net device, which acts as a powerful brake, and stops them quickly

* See Frontispiece of November issue of the Institute.

but without injury to the machines. Just ahead of the net is a large hatch and there is another one abreast of the conning tower. Through these the airplanes are passed up or down from the flying-deck to the hangar deck below. Just ahead of the forward hatch are two of the new compressed-air catapults, which were designed and developed last year at the League Island Navy Yard. Each of these is carried on a turntable, and they are capable of being trained through a wide arc forward of the beam. They are so constructed that, by the time the airplane leaves the catapult, it has a velocity sufficient for flight. Arranged centrally between the catapults, and extending to the bow of the ship, is an endless chain, or wire rope, by means of which also an airplane may be launched; but the details of this mechanism will not for the present be available for the public. Below the flying-deck is a hangar, which is of sufficient size for the stowage of a large fleet of airplanes. On this deck are also various machine shops, where thorough repairs can be made to disabled machines. The vessel is also fully equipped with fuel tanks and the various stores which are necessary to maintain the airplane fleet in first-class fighting condition during an extended cruise at sea. The five large openings abreast of the smokestack are airports opening onto the hangar deck.

The battery of sixteen 6-inch guns is disposed as follows: Forward on each side of the hangar deck are two casemates carrying four guns on twin mounts, and aft on the deck below are mounted four on each side, eight 6-inch guns, which are on twin mounts. On the deck below these are triple torpedo tubes of the standard type used on our destroyers. It should be noted that the flying-deck is cut in for two-thirds of its length to allow for the mounting of twelve anti-aircraft guns. In reducing the displacement of these ships to 35,000 tons heavy reductions had to be made both in the structure and motive power. A great part of this was achieved by removal of the heavy 16-inch gun battery and its turrets, and the heavy protective external and internal armor. Another great reduction was achieved in reducing the horsepower from 180,000 to 33,000, this being made possible both by the lighter displacement and by the reduction of the speed from 33¼ knots to 22 knots, which will be sufficient for the *Lexington* and the *Saratoga* to cruise with the fleet.—*Scientific American*, December, 1922.

STATESMEN TO WITNESS FLEET EXERCISES.—Facilities will be afforded by the Navy Department for the members of the naval committees of the Senate and the House and the appropriations committees to witness the joint fleet maneuvers off Panama in the early spring. These exercises promise to be more than usually interesting, especially that portion of the program in which the former *Iowa* will be utilized as a moving target while being controlled by radio without a soul on board. The present plan is for the Navy transport *Henderson* to convey the congressional party to isthmian waters, sailing early in March. That transport will make one voyage to the Pacific meanwhile, but will be back in ample time to prepare for the special trip to Panama.—*Army and Navy Register*, 18 November, 1922.

THE NAVY UNIFIED.—Washington, December 8.—Consolidation of the Atlantic and Pacific fleets, into the "United States Fleet" with Admiral H. P. Jones in supreme command, and Vice Admiral E. W. Eberle as commander-in-chief of the "battle fleet" unit, is announced by the Navy Department. The reorganization, the Department said, involved no change in any present assignment of ships or Navy personnel, but was

chiefly for the purpose of affecting a peace-time organization that could be carried into a war emergency without change.

Under the new plan, the United States Fleet will consist of the battle fleet, composing the main fighting strength of the Navy prepared to engage an enemy fleet; the scouting fleet, the duty of which would be to locate the enemy preparatory to engagement of the battle fleet; the control force, organized to exercise control of the sea and the fleet base force, intended to support the operations of the fighting forces.

The whole organization for purposes of administration in peace or war would be under command of a single officer with the rank of admiral, no matter how far scattered its elements might be.

Admiral Jones now commanding the Atlantic Fleet, is the first to command the United States Fleet, while Admiral Eberle, now commanding the Pacific fleet, takes the rank of vice admiral and command of the battle fleet.

The battle fleet will be composed of battleship divisions under a vice admiral, light cruiser divisions, destroyer squadrons, aircraft squadrons and such submarine divisions as may be assigned. The scouting fleet will be under command of Vice Admiral J. D. McDonald, and will be composed of battleship divisions, light cruiser divisions, destroyer squadrons, aircraft squadrons, submarine divisions and train. The control force will be under command of a rear admiral to be assigned as the relief of Rear Admiral McCully, just ordered as president of the board of inspection and survey, and will be composed of cruiser divisions, destroyer squadrons and mine squadrons.

The fleet base force will be under the command of Rear Admiral J. V. Chase, and will be composed of mine squadrons, aircraft squadrons and train.—*Boston Evening Transcript*, 8 December, 1922.

NAVAL PETROLEUM RESERVES.—The Secretary of the Navy announced December 14, that in pursuance of the Departmental policy concerning the Naval Petroleum Reserves, an arrangement has been made extending the contract heretofore concluded between the Government and the Pan-American Petroleum and Transport Company. Under this supplementary contract the drilling of offset gas wells in those portions of the Naval Reserve No. 1 that are now being drained is to be proceeded with immediately. This is in accordance with the principles of the original contract that granted to this Company preferential rights to further leases in Naval Reserve No. 1. The Government had also obtained the right to require the company to drill additional wells as offsets to any on adjoining private lands when ever such may be required in the future. The original contract with the Pan-American Company provides for the construction and filling with fuel oil of storage at Pearl Harbor. The supplemental agreement requires the completion of the project at this point for converting such additional available royalty oils as may be accruing into other storages at such points as may be designated by the Secretary of the Navy.

The West side of Naval Reserve No. 1 is retained as an underground oil reserve in which no wells can be drilled at any time except by specific authority of the Navy Department. Provision is made, however, for drilling even in this restricted area whenever necessary to protect the Government land from drainage.—J. B. H.

BUDGET ALLOCATION OF THE DOLLAR.—Washington.—The estimate of appropriations needed for the fiscal year beginning July 1, 1923, and ending June 30, 1924, as submitted by the Budget Bureau, completely de-

molishes that standard piece of fiction which has been in service many years, to the effect that ninety cents out of every dollar expended by this government is expended for war purposes. The Budget Bureau analyzes the estimated expenditures, showing how the average dollar appropriated will be divided. The division will be as follows:

For support of the legislative branch of the government, 4 cents; for the Veterans Bureau, 14.5 cents; for other commissions, boards and bureaus outside the regular departments, 1 cent; Department of Agriculture, 4.9 cents; Department of Commerce, .6 cents; Department of the Interior, 10 cents; Department of Justice, including United States Supreme Court and other federal judiciary, .6 cents; Department of Labor, .2 cents; Navy department, 10.1 cents; State department, .5 cent; Treasury department, including appropriations for payment of interest on public debt and reduction of principal, 46.5 cents; War department, including administration of Panama Canal, river and harbor improvements and other non-military activities, 9.9 cents; District of Columbia, .8 cents. The Postoffice department is largely supported from postal revenue.

This clearly shows that the United States is far from being a militaristic nation. In fact, in another chart furnished by the Budget Bureau it is demonstrated that out of every dollar expended, only 13.5 cents goes to purely military and naval purposes in the interest of national defense. The total expenditures charged as "military functions" are 32.7 cents out of every dollar. This includes the 13.5 cents above mentioned for strictly defense purposes and 19.2 cents for pensions, retirement pay, Veterans Bureau, etc.—*National Republican.*

A DEFINITE NAVAL POLICY.—The statement of general policy contained in the Annual Report of the Secretary of the Navy was drawn up by the Navy General Board, and was said by the Secretary to be in his opinion not only sound in the present circumstances but useful "for all times and under all conditions." The major premise of the policy was this:

"The Navy of the United States should be maintained in sufficient strength to support its policies and its commerce, and to guard its continental and overseas possessions."

As a corollary to this basic principle and in view of the Naval Limitation Treaty terms, the General Board further adopted this statement of purpose:

"To create, maintain, and operate a Navy second to none and in conformity with the ratios for capital ships, established by the treaty for limitation of naval armaments.

"To make the capital ship ratios the basis of building effort in all classes of fighting ships.

"To direct the principal air effort on that part of the air service that is to operate from ships of the fleet.

"To assemble the active fleet at least once a year for a period of not less than three months.

"To maintain an active personnel afloat in conformity with the ratios for capital ships established by the treaty for the limitation of naval armament.

"To maintain the Marine Corps personnel at a strength sufficient for current requirements.

"To make every effort, both ashore and afloat, at home and abroad, to assist the development of American interests, and especially the American merchant marine.

"To create, organize, and train a naval reserve force sufficient to provide the supplementary personnel necessary to mobilize the fleet and all its auxiliaries.

"To make the naval reserve secure in its status and organization as a part of the Navy and to guard its interests.

"To cultivate a close association of officers of the active Navy and of the naval reserve.

"To give to the public all information not incompatible with military secrecy.

"To have always in mind that a system of outlying naval and commercial bases suitably distributed, developed, and defended is one of the most important elements of national strength."

The secretary, commenting on this declaration in connection with his discussion of the results of the Armaments Conference, said that the Navy Department had been "entirely in sympathy" with the purposes of the conference, and predicted that the benefits of eliminating competitive navy construction will be realized more and more fully as the years go by.

"For the first time in the history of our country," he said, "the Navy and Congress have a definite naval policy and building and maintenance standard to work to, a standard which is proportionate to our position as a world power. The maintenance of this standard in all respects is necessary to our defense and to our prestige. . . .

"In the past, owing to the lack of a definite naval policy, and to the more pressing need for building up our naval strength in capital ships, it has been impossible to maintain a well-rounded navy. I feel it my duty to report to you that in certain types such as fast cruisers, aircraft carriers, seagoing submarines and aircraft, the Navy is deficient.

"It is not my intention this year, having in mind the financial condition of the country, to make any recommendations for an increase in the Navy, but I recommend that, as soon as conditions warrant, Congress be asked for such an increase as will tend to balance our fleet and make and keep it the equal of any in the world."—*Boston Evening Transcript*, 4 December, 1922.

NEW CONSCRIPTION LEGISLATION.—Of great importance is the project for having on the statute books authority for the President to place the population of the country on a state of availability for industrial, as well as military, service in time of war. Such legislation is sadly needed in order that the citizenship of the nation may become useful in every direction required for the maintenance of the defensive forces and the support of the people at home. It was one of the disastrous consequences of imperfect, or at least incomplete, legislation that the industries of the United States were not under greater control by the Government during the World War and that the workers in the plants and in the field were not as much of the conscripted forces as the members of the military-naval personnel. It would have completely regulated the enormous resources of the country; it would have checked the soaring prices of commodities; it would have stabilized and restricted the wages of those engaged in pursuits at home; it would have enabled the owners and managers of the industries and, especially, the railroads to have conducted those activities without the necessity of turning them over to incompetent and well-nigh ruinous governmental management. There is no reason why every person engaged in any sort of labor, whether productive of war material or supplies for common consumption, should not be drafted into a huge industrial force, with pay corresponding to the compensation of the fighting man or the man in training for fighting. One of the glaring inconsistencies of the war period was the enormous difference in the wages of the man who stayed at home in security and followed his trade and the pay of the man who was drafted for the military-naval service. It is a matter for which provision should be made in advance of war, in such

general terms that will make the system immediately applicable and accessible, leaving it to Congress to fill in the details in accordance with the circumstances of the situation and the demands of the period. The Government need not and should not be permitted to "take over" industries in the sense that it will relieve the experts of their function of management or to the extent that made an unholy spectacle of the so-called governmental administration of the railroads. Every plant should be permitted to operate under its own management, but there should be a limitation placed on wages and on the profits of the owners, to the end that there shall be no such thing as profiteering either by the employé or the employer; no such thing as fattening Government contracts, the basis of which should be the actual cost for labor and material as determined by reduced costs of those factors. It should be possible to apply this system of compensation to the employer and the owner in order that individual income shall be reduced to the minimum. On this basis the cost of living would be held in restraint. The population of the country would, in other words, be entirely separated from gain for the sake of gain. "Prosperity," as represented by private accumulation of capital, would disappear or be suspended for the period of the war. Everyone would be on the same footing, and, at the end of the war, no advantages would be possessed by one class to the detriment of another. A step in the right direction is proposed in new legislation that will be introduced with the intention of having it gain the confidence of Congress and the people, with the plan that, if nothing is accomplished at the present short session, it will furnish the subject of discussion in the new Congress which comes into existence next March. Following is the form of such preliminary action:

1. That, in the event of a national emergency declared by Congress to exist, which in the judgment of the President demands the immediate increase of the military establishment, the President be, and he hereby is, authorized to draft into the service of the United States such members of the unorganized militia as he may deem necessary: Provided, That all persons drafted into service between the ages of twenty-one and thirty years, or such other limits as the President may fix, shall be drafted without exemption on account of industrial occupation.

2. That in case of war, or when the President shall judge the same to be imminent, he is authorized and it shall be his duty when, in his opinion, such emergency requires it—

a. To determine and proclaim the material resources, industrial organizations, and services over which Government control is necessary to the successful termination of such emergency, and such control shall be exercised by him through agencies then existing or which he may create for such purposes;

b. To take such steps as may be necessary to stabilize prices of services and of all commodities declared to be essential, whether such services and commodities are required by the Government or by the civilian population. —*Army and Navy Register*, 25 November, 1922.

BRAZIL

STRENGTH OF BRAZIL'S NAVY.—The Brazilian Navy's strength is 13,000 men. Of ships it has two battleships of the dreadnaught type, three scout cruisers, six destroyers and three submarines, also some coast defense vessels of old type.

Those who are conversant with the naval armaments of the Latin American countries consider that Brazil's navy is probably second to that of Argentina which also has the same number of battleships of the dreadnaught type as Brazil, but is slightly stronger in the auxiliary types.

Brazil has no navy yards at the present time, and even had she assented to the proposals laid down by the disarmament conference she would not have been in position to over-supply her naval needs. Through her representative at the League of Nations, Brazil objected to a plan submitted recently to the disarmament commission of the League whereby the military establishments of all nations would be reduced. It is said that Brazil's military expenses at present are about forty-five per cent less than they were in 1913.

When Secretary of State Hughes and Brazilian Ambassador Augusto Cochrane de Alencar signed the agreement providing for the special naval mission, on November 6 last, Secretary Hughes explained the objects as follows:

"The purpose of the mission is one of helpfulness to Brazil, to assist the Brazilian Navy Department in all matters that pertain to improvement in their naval service. In this task the mission will collaborate and work in conjunction with the officers of the Brazilian Navy."—*Boston Evening Transcript,* 8 December, 1922.

JAPAN

BUILDING PROGRAM.—London, November 7.—In the latest number of the *Marine Rundschau,* a review of current naval progress issued monthly by the German Navy Department and therefore based upon authoritative information, there is a careful analysis of that part of the Japanese building program which has not been affected by the limitation treaty. It is pointed out that, although Japan claims to have dropped thirty-eight vessels, including one cruiser, from her original auxiliary program, the actual saving in displacement amounts to no more than 14,000 tons, which proves conclusively that all the surviving vessels must have been redesigned with much larger dimensions.

At the end of the World War, continues the *Rundschau,* Japan had only three modern light cruisers—*Yahagi, Hirado* and *Chikuma,* which were ships of 5,000 tons, launched in 1911, and mounting eight 6-inch guns apiece. These, however, were not counted, either in the building program of 1920-28 nor in the amended post-conference scheme of 1922-27, although they are still effective ships.

According to the first program the establishment of 1928 was to include twenty-six light cruisers of the first line; in the revised program the number is reduced to twenty-five. Of these the following are already completed: Two ships of the *Tenryu* class and six ships of the *Kuma* class. Three further ships of the *Kuma* class have been launched and all five ships of the following (*Kinu*) class are under construction, though only the *Kinu* herself has been lauched up to now.

Four ships of a still later class (*Kako*) have also been put in hand, but there is no definite information concerning the remaining cruisers beyond the recent message from Tokio that the *Kinugusa* and *Furutori* were to be laid down shortly. The reports of their dimensions are conflicting; some messages credit them with 10,000 tons, others with only 7,000 tons, but the *Rundschau* thinks the first figure is probably nearest the mark. Finally the name of a new cruiser, the *Yubari,* has lately been heard, but it is not known to which class she belongs. (This ship has since been identified as one of the new 7,500-ton class.)

The *Rundschau* prints a table, reproduced on page 338, to show the present state of development of the Japanese cruiser fleet.

Commenting on this table, the *Rundschau* says it is possible that cruisers Nos. 18 to 21 displace 10,000 tons, and those numbered as 22 to 25 may be ships of only 7,000 tons. The extraordinary number of cruisers now build-

ing in Japan is explained by the fact that the authorities, being anxious to avoid the wholesale discharge of workmen that would have been necessary had no contracts been substituted for those canceled by the limitation treaty, decided to put in hand the bulk of the auxiliary program without delay in order to give employment to the shipyard workers.

The original destroyer program has been curtailed, thirteen boats of the second-class being dropped. On the other hand, all the first-class boats authorized previous to the conference are to be proceeded with, and twenty-four of them are now building or on order, each with the big displacement of 1,500 tons. Their completion will bring the Japanese flotilla of first-class boats up to forty-six, and there will also be forty-one modern second-class boats of 850 tons. Referring to the Japanese submarine program, the *Rundschau* says that it was first intended to have ready by the year 1928 a fleet of ninety-three big underwater boats, besides seventeen smaller submarines suitable for coast-defense operations.

Under the modified post-conference scheme, twenty-four of the new submarines have been canceled, bringing the total of ocean-going boats down to sixty-nine. (These, however, are to be of considerably larger dimensions than had originally been planned.) Finally, the *Rundschau* learns that four airplane carriers are completing—the *Hosho* and *Shokaku*, each of 9,800 tons and high speed, with unobstructed decks and accommodation for twenty to thirty airplanes apiece, and the converted battle criusers *Amagi* and *Akagi*, each of which is to carry fifty airplanes.

The foregoing data, compiled by the German Navy Department from its official sources of information, coincide very closely with the details which have been received here direct from Japan, but the latest intelligence at hand shows the amount of submarine construction actually in progress or on order to be understated. At least ten boats should be added to the sixty-nine, bringing the total of heavy long-range submarines up to seventy-nine, and even this figure is believed to be short of the real number.

Furthermore, the displacement of several ships in the cruiser table is larger than that shown, the *Abukuma, Ayase, Minase* and *Otomase* being vessels of 6,500 tons or thereabouts, and the *Yubari* of 7,500 tons, and their armament is, therefore, probably more powerful than the table suggests. On the other hand, I understand that the airplane carrier *Shokaku* has been canceled, or indefinitely postponed, so that the number of these ships actually building is reduced to three.

None of the totals of present Japanese naval construction takes into account the auxiliary vessels, properly so called, of which large numbers are being built. These include mine-layers, ammunition ships, colliers, oil tankers and so forth, all of which are equipped with defensive armament. The one outstanding feature of the situation is that Japan today is building a far larger aggregate of naval tonnage than any other power—in fact, it would probably be no exaggeration to affirm that she is building as much if not more of this tonnage than all the other powers put together.

Present state of development of the Japanese cruiser fleet, as reported by the German *Marine Rundschau:*

No.	Name	Date of Launch	Completion	Displacement in Tons	Armament
1.	*Tenryu*	1918	1919	3,500	4 5.5-in. guns
2.	*Tatsuta*	1918	1919	3,500	6 Torpedo tubes
3.	*Kuma*	1919	1920	5,600	
4.	*Tama*	1920	1921	5,600	
5.	*Kitakami*	1920	1921	5,600	
6.	*Kiso*	1920	1921	5,600	
7.	*Oh-i*	1920	1921	5,600	
8.	*Nagara*	1921	1921	5,600	
9.	*Isudzu*	1921	1922	5,600	
10.	*Natori*	1922	....	5,600	7 5.5-in. guns
11.	*Yura*	1922	....	5,600	8 Torpedo tubes
12.	*Kinu*	Bldg.	....	5,600	
13.	*Ayase*	Bldg.	....	5,600	
14.	*Otonase*	Bldg.	....	5,600	
15.	*Minase*	Bldg.	....	5,600	
16.	*Abukuma*	Bldg.	....	5,600	
17.	*Yubari*	Bldg.	....	5,600	
18.	*Kako*	Bldg.	....	7,000	
19.	*Naka*	Bldg.	....	7,000	Guns unknown
20.	*Sendai*	Bldg.	....	7,000	probably 6-in.
21.	*Jintsu*	Bldg.	....	7,000	
22.	*Kinugasa*	Bldg.	....	10,000	
23.	*Furutori*	Bldg.	....	10,000	Battery of 8-inch
24.	Unnamed	Bldg.	....	10,000	guns.
25.	Unnamed	Bldg.	....	10,000	

—Hector C. Bywater in *Baltimore Sun,* 3 December, 1922.

COMPETITION IN MERCHANT MARINE.—Seattle, Wash., November 30.—Contrary to the latest reports that the Shipping Board's merchant marine is financially unsuccessful, the big liners operated across the North Pacific to the Orient are rapidly putting the allied Japanese lines out of business.

The Shipping Board's ships are carrying capacity cargoes and heavy passenger lists.

The largest shipment of raw silk to be brought from Japan in one ship arrived here recently on the *President Grant,* valued at $8,000,000. In all, the cargo valuation was more than $12,000,000. Bound to the Far East, they carry immense loads of lumber, wheat, flour, manufactured goods, cotton, tobacco and canned goods.

The Japanese liners, though subsidized by the Imperial Government, are face to face with a formidable competitor for the first time in the history of North Pacific shipping.—*Baltimore Evening Sun,* 30 November, 1922.

MERCHANT MARINE

HOUSE CHANGES IN SUBSIDY BILL.—After having been further amended, the ship subsidy bill was passed by the House on November 29 by a vote of 208 to 184. Only four Democrats supported the bill while 69 Republicans voted against it.

The most important modification was that adopted at the suggestion of Representative Madden of Illinois forbidding any expenditure to be made from the Merchant Marine Fund except out of appropriations voted annually by Congress.

Another change affecting the industrial ships was offered by Mr. Edmonds to meet the strong opposition that came from both sides against the Government paying several million dollars annually to industrial companies owning ships used for the exclusive transportation of their own commodities. The amendment, however, did not exclude them from the benefits of the direct aid, it being provided that the industrial ships might receive subsidy for that portion of their revenues attributable to cargoes carried for other interests.

The House accepted without much discussion the amendment offered by Representative White of Maine making it possible for sailing ships, as small as 500 tons, instead of 1,000 tons, to receive subsidies.

The provision allowing shippers a rebate from their income taxes equal to five per cent of the amount paid American vessels for the carriage of freight was eliminated. Advocates of the bill consented to its being stricken out because they believe that it was unconstitutional and would not stand in the courts.

The interest rate on the $125,000,000 Construction Loan Fund was increased from two to four and a quarter per cent. As this is a much lower rate than foreign shipowners are obliged to pay for shipbuilding funds, this change is satisfactory to the friends of the bill.

An amendment approved by the Post Office and the shipowners provides that the Post Office shall pay steamship lines for all mails carried instead of turning over approximately four million dollars a year to the general subsidy fund and requiring the mails to be handled free. This change will increase the revenue of the fast passenger and mail liners and serve as a recompense for the losses caused by our prohibition legislation.

The provision permitting the Shipping Board to sell vessels at private competitive sales without advertisement was struck out of the bill. The other amendments were of minor importance and were adopted either to safeguard the public interest or to clarify the language of the bill.—*The Nautical Gazette*, 9 December, 1922.

SENATE CHANGES IN SUBSIDY BILL.—Instead of accepting the ship subsidy bill in the form passed by the House, the Senate Commerce Committee has changed the measure in several particulars. The most important amendment was the striking out of the Madden provision requiring Congress to pass annual appropriations for any sums to be paid out of the Merchant Marine Fund as subsidies to shipowners. In a letter to Senator Jones, President Harding had objected to this clause on the ground that it would interfere with the organization and financing of new and smaller shipping concerns as well as with the purchase by private parties of the Government's tonnage which is one of the main objects sought to be obtained by the pending bill. While eliminating the Madden amendment, the Senate Committee added a new clause proposed by Senator Willis of Ohio making it impossible for the Shipping Board to augment any individual shipping concern's basic rate of compensation unless Congress should consent thereto and appropriate annually the additional sum required to make such increase effective. It remains to be seen whether Congress will approve this compromise.

The Senate Committee also eliminated the amount of compensation payable in any one year to $30,000,000, or sufficient to subsidize 7,500,000 tons of privately owned and operated shipping. This maximum sum is only three-fifths of the estimated annual yield of the tonnage dues and of the

proportion of all import duties collected set aside for the Merchant Marine Fund under the terms of the bill. The question has been raised what would become of the remaining and unexpended balance of the fund which it is intended to segregate permanently from the other moneys in the Federal Treasury. It is to be regretted that the Committee struck out the clause allowing vessel owners to deduct from their taxable incomes any sums earned by their ships in the foreign trade and set apart for new vessel construction. Even though no substantial results are to be anticipated from this clause during the present shipping depression it may prove of value hereafter when normal conditions again prevail. An advisable change seeing that it would prevent the Shipping Board from turning down an individual in secret was the insertion of a provision providing that no application for a subsidy contract could be refused until after a public hearing.

This exhausts the list of important modifications made to the House bill by the Senate Committee. The amendments that have been made have not allayed the opposition to the bill and its passage by the Senate is doubtful. Proponents of the pending Merchant Marine Act continue to claim higher operating costs are responsible for the laying up of a large part of our merchant tonnage when the real cause is a lack of cargo. Even the Shipping Board admits this, for in its just issued annual report it states that during the first half of the fiscal year 1921-22 its "tankers were fairly well employed in all trades which showed a profit on the round trip." Later on a material change occurred in the demand for oil and it became necessary to tie up more of its oil carriers each month because of a reduced demand for tankers. The same conditions confronted private owners of American tank tonnage, a situation which payments from the national treasury would not have remedied. Again, in explaining the deficit of $587,332.45 incurred by his company in the fiscal year ending June 30, 1922, Vice-president Drake of the Panama Railroad Steamship Line states that the primary cause of this loss was the world-wide depression in business with its consequent heavy decrease in tonnage transported. The real cure for the depression our shipping is suffering from is more business and not Government doles.—*The Nautical Gazette,* 16 December, 1922.

AMERICAN AND FOREIGN SEAMEN.—In rapidly increasing numbers native American seamen are deserting the ships of our mercantile fleet and leaving them to be manned by polyglot crews of foreigners. On December 1, 1920, about fifty per cent of the crews on merchant vessels under the Stars and Stripes were native born Americans, but from that time the proportion has steadily decreased until today it is as low as fifteen per cent. In the same period the ratio of naturalized Americans dropped from twenty per cent to less than five per cent. If this condition continues it will not be long before an American seaman will be come a rara avis.—*The Nautical Gazette,* 9 December, 1922.

ITALY'S MERCHANT FLEET.—As compared with 644 ocean-steamers of 1,534,738 gross tons on December 31, 1914, Italy possessed 868 steamers of 2,539,833 tons on July 1, 1922, says E. T. Chamberlain, of the Transportation Division of the Department of Commerce in *Commerce Reports.*

When Italy entered the war sixty-nine steamers of the Central Powers aggregating 251,000 gross tons were seized in Italian ports and employed thereafter in her fleets, but of these forty-two were lost or allotted to other powers. The treaty of St. Germain provided that Austria and Hungary should surrender all their property in merchant ships and fishing boats without regard to size, and from this source, under awards of the Reparations Commission, Italy up to the end of June, 1922, had received 213

steamers of 578,000 gross tons. From a shipping point of view Italy came out of the war, judged by present tonnage figures, in better condition than any other European power except Belgium.—*The Nautical Gazette*, 16 December, 1922.

"MAJESTIC'S" NEW OCEAN RECORD.—On her last eastward voyage the White Star liner *Majestic*, just out of dry dock and equipped with new propellers, made a record passage between New York and Cherbourg. Her average speed was 24.59 knots an hour. The *Majestic* left Ambrose Channel lightship at 12.57 P. M. on November 25, and passed the buoy off Cherbourg breakwater at 12.10 midnight on December 1. The total distance covered was 3,100 miles. The previous best run to Cherbourg from this port was five days eight hours and nine minutes, made by the Cunarder *Mauretania*, which covered the long summer course of 3,201 miles at 25.33 knots or a higher hourly average than the *Majestic's*.—*The Nautical Gazette*, 9 December, 1922.

ENGINEERING

THE PROPULSION OF SUBMARINES.—To many people, no doubt, the news that a fatal explosion had occurred on board submarine *K-26* at Chatham Dockyard on November 3 was the first intimation that a steam-driven submarine vessel is being constructed for the Royal Navy. The boat in question belongs to the famous *K* class, and is one of a number of vessels of war which had been laid down prior to the Armistice, and whose completion was decided upon for special reasons. The *K-26* was begun by Vickers in July, 1918, launched in August of the following year, and towed to Chatham for completion. At the time of the accident she was being prepared for trial. According to the evidence given at the inquest on November 6, the safety valves were being tested, when a large escape of steam took place, filling the machinery compartments with dense clouds of steam, smoke and soot. Two men in the boiler room were so badly scalded that both succumbed to their injuries. An inspector of fitters, giving evidence, explained that the steam from the boilers, which had reached a pressure of over 200 lb., rebounded against the bottom of the waste steam pipe, and was forced through the furnace into the boiler room. The waste steam pipe was of a special design, necessitated through lack of space on board submarines, but the shape of that pipe was to be modified. Such an accident, he added, was impossible in any other type of ship. The authorities were satisfied that the valves were in working order. Fortunately, the oil sprays were not burning at the time. Engineer-Commander Mitchell, another witness, explained that before a submarine of the *K* type dived while at sea, the order, "Prepare to dive," indicated to the men in the boiler room that they must leave it at once to avoid an accident, similar in some respects to the present one. Before submersion took place the doors covering the funnels were closed.

The *K* class submarines have no parallel, either among British submarines or among the underwater boats of the world. They were designed for the special purpose of accompanying the battle fleet on its war cruises and acting in tactical co-operation with it. For that purpose it was necessary to endow them with good sea-keeping qualities and high speed, and the latter requirement involved the use of steam engines in place of the internal combustion motor usually fitted in submarine vessels. Since the war this class has been exposed to a good deal of criticism, but the fact remains that within the limted scope of duties they were intended to fulfil the boats were reasonably successful. Their actual value in the fighting line was never tested, as no major fleet engagement was fought after they came

into service. The peculiar features of the design were ventilated in the press nearly two years, when *K-5* foundered with all hands in the Western Approaches while exercising with the fleet. On that occasion Rear Admiral S. S. Hall—who had been Commodore of Submarines during the war and could therefore speak with high authority—described the class as "freak" submarines, and affirmed that they had always been a source of great anxiety in bad weather or in rapid diving. That was because of their great length and the structural complications due to the employment of steam, which necessitated large openings for funnels and air intakes to the boiler rooms. Thorough training on the part of the *personnel* is essential to the safe handling of these boats. They have no fewer than five kinds of motive power for propulsion on and under water and for operating the complicated system of machinery with which they are fitted. To attain the designed surface speed of 24 knots, two sets of single reduction turbines are installed, taking steam from two small-tube boilers with forced draught. When the boat is required to dive quickly or to get under way promptly after breaking surface, an 800 brake horsepower Diesel motor is called into play, and for navigation under water electro-motors are employed. Other machinery includes electric motors for lowering the funnels and closing water-tight hatches over the funnel openings; air compressors for charging air bottles and blowing ballast tanks; and hydraulic power for working the hydroplanes and raising the periscopes and telescopic masts. It is no wonder therefore that every *K* boat is known in the Navy as "a box of tricks." When commenting on the loss of *K-5*, Admiral Hall expressed surprise that any of the class had been kept in commission after the war. It was presumably done with the intention of perfecting their maneuvers with the battle fleet, "but," he added, "it appears to be a very questionable policy, since the class will be obsolete long before a fleet battle can take place. They were designed solely for the North Sea, and have not the qualifications nor the sea endurance to accompany a battle fleet under war conditions, except in home waters." The Admiralty, however, must have had good reasons for deciding to complete the *K-26*, although five sister boats unfinished at the Armistice were cancelled. That steam will ever be reverted to as the motive power of future British submarines is not very probable. For this type of vessel it has inherent drawbacks. So far as the British Navy is concerned, it was first tried in the *Swordfish*, a pre-war submarine which proved a failure, and it would certainly not have been re-introduced in the *K* class, but that the attainment of the very high speed aimed at was impracticable with Diesel engines. Our fastest boats—and indeed the swiftest submarines of any navy during the war—were those of the *J* class, fitted with three engines, each having twelve cylinders and developing a total of 3,600 brake horsepower. In France, however, steam propulsion for submarines has been in vogue many years, and although the system is apparently being abandoned, several of the largest boats of her present-day navy are steam-driven. They are the *Dupuy de Lôme*, the *Sané* and the *Gustave Zédé*, with a surface displacement of approximately 850 tons. We understand that the French naval authorities are considering a project of replacing the steam machinery of these three submarines with Diesel engines taken from surrendered German boats. Should this decision be reached, it will not be easy to reconcile with the reports, lately published in France, of the remarkable success which has attended the performance of the Schneider-Carels Diesel motors installed in the large submarines, *Néréide*, *Fulton*, and *Joessel*, two of which are said to have exceeded their designed speed of 16½ knots by 1½ knots. Commenting recently on the development of the French submarine flotilla, the Paris *Temps* stated that the problem of manufacturing an entirely satisfactory motor for submarine use had at length been

solved, and "we now possess a motor, entirely French in type, which is in no way inferior to the Diesel engines that made the fortune of the German fleet." The Commandant of Toulon naval station is quoted as having reported that the *Néréide, Fulton* and *Joessel,* equipped with the new French motor, leave nothing to be desired. In these circumstances, it is not clear why the motors of ex-German submarines should be used to re-engine the French steam-driven boats which it is proposed to convert to Diesel drive.

When the war broke out, we in this country were admittedly behind Germany in the production of high-power Diesel motors suitable for submarines, and so long as the struggle continued there was no opportunity to develop an engine capable of giving an output of power per cylinder equal to that of the German type. Germany's largest submarine engine developed 300 brake horsepower per cylinder, and the ordinary *U* boat engine 200 brake horsepower. As Mr. A. W. Johns has pointed out in a paper on German submarines, the necessity for quick production of engines in this country during the war prevented progress beyond the standard 100 brake horsepower per cylinder though the obvious advantages, from the point of view of hull design, conferred by the reduced length of the larger cylinder engine for the same total power were clearly recognized by our designers. Since the war the Admiralty has been devoting much attention to the improvement of submarine motors, and notable progress is believed to have been made, though hampered of late by the reduced funds available for research and experimental work on behalf of the Navy. The features of the *X-1,* a submarine laid down at Chatham twelve months ago, have yet to be disclosed, but it is a safe presumption that she will be propelled by Diesel engines. Meanwhile, the impending trials of the *K-26,* the last of our steam-driven boats, will be watched with interest, though it would appear from the account of the explosion at Chatham that she is not free from the disabilities which have caused most of the other units of her class to be withdrawn from active service.—*The Engineer,* 17 November, 1922.

STAINLESS STEEL TUBES.—It is of very great interest to note that Messrs. Firth, of Sheffield, have, after a lengthy series of experiments, succeeded in manufacturing stainless steel tubing. So far, we believe the tubes which have been produced do not exceed fifteen feet in length and are about three inches in diameter; but even so, the fact that stainless steel tubing can now be manufactured should be carefully noted by engineers and particularly by makers of condensers and similar appliances. Stainless steel is admittedly expensive, and on the score of its cost its use has been restricted to a greater extent than by any other factor. We would be prepared to find that in the case of stainless steel tubing the influence of cost would be still more restrictive. On this head, however, it seems to be hinted that it has been found possible, not only to produce stainless tubing, but also to produce it in a manner new to tube making in general, involving fewer processes and a greatly reduced manufacturing cost.—*The Engineer,* 1 December, 1922.

ENAMELLED PROPELLERS.—An improvement in the manufacture of ship screw propellers has been made by providing them with an enamel coat, a process which has recently been patented by the Helix Company, of Berlin. Up to now, high-class vessels have been provided with bronze propellers, well machined and polished, which do not corrode; but as bronze is very costly, ordinary freighters and similar craft have generally been fitted with cast-iron or cast-steel propellers. The disadvantages of the latter are that they are soon corroded by the action of sea water

and that their rough surfaces considerably reduce the screw efficiency, so that the speed of the ship is reduced in comparison with that obtained with a bronze propeller. It is claimed that the new Helix enamel coating has the same effect as the adoption of bronze. The enamel is applied to the propeller surface with the propeller red hot and makes the blades of cast-iron and cast-steel screws as smooth as if polished, and there is no subsequent corrosion. Experience with Helix enamel-coated propellers is said to have shown excellent results, especially as concerns efficiency, the speed of vessels having been decidedly improved after the existing propellers had been enamelled. Another advantage of the enamelled propeller is that it can be easily seen in clear water, and thus ropes or other obstructions fouling the propeller can be easily noticed and removed without the aid of a diver. Helix enamel-coated propellers have been largely introduced on German and Dutch river and seagoing vessels.—*The Shipbuilder,* December, 1922.

DIESEL-ELECTRIC SHIP "PELIKAAN."—The *Pelikaan,* an illustration of the engine room of which is shown on the opposite page, is a mothership for submarines for service in the Netherlands East Indies. The vessel was built by the Netherland Shipbuilding Company, Amsterdam, and engined by the "De Schelde" Shipbuilding & Engineering Company, Flushing.

The principal dimensions of the *Pelikaan* are:

Length, overall	307 ft. 2 in.
Breadth	42 ft. 7 in.
Depth	27 ft. 2 in.
Draught	13 ft. 2 in.

As a considerable amount of repair work has to be carried out on the vessel, a well-equipped workshop is installed and also storage sufficient for the running stores required for six submarines. The oxygen store contains a battery of twenty-four cylinders of oxygen, the contents of which can be pumped into the oxygen cylinders on board a vessel lying alongside. This store also contains seventy-eight cylinders of carbonic acid gas. On the upper deck of the vessel is a hangar for two seaplanes which are handled by an electric winch and a derrick attached to the main mast. In this compartment the tanks for petrol and oil for the 'planes and the motor boats are fitted. A battery of cylinders of carbonic acid gas is fitted immediately beneath the hangar to which there is a connection, so that the compartment can be filled with gas in case of fire.

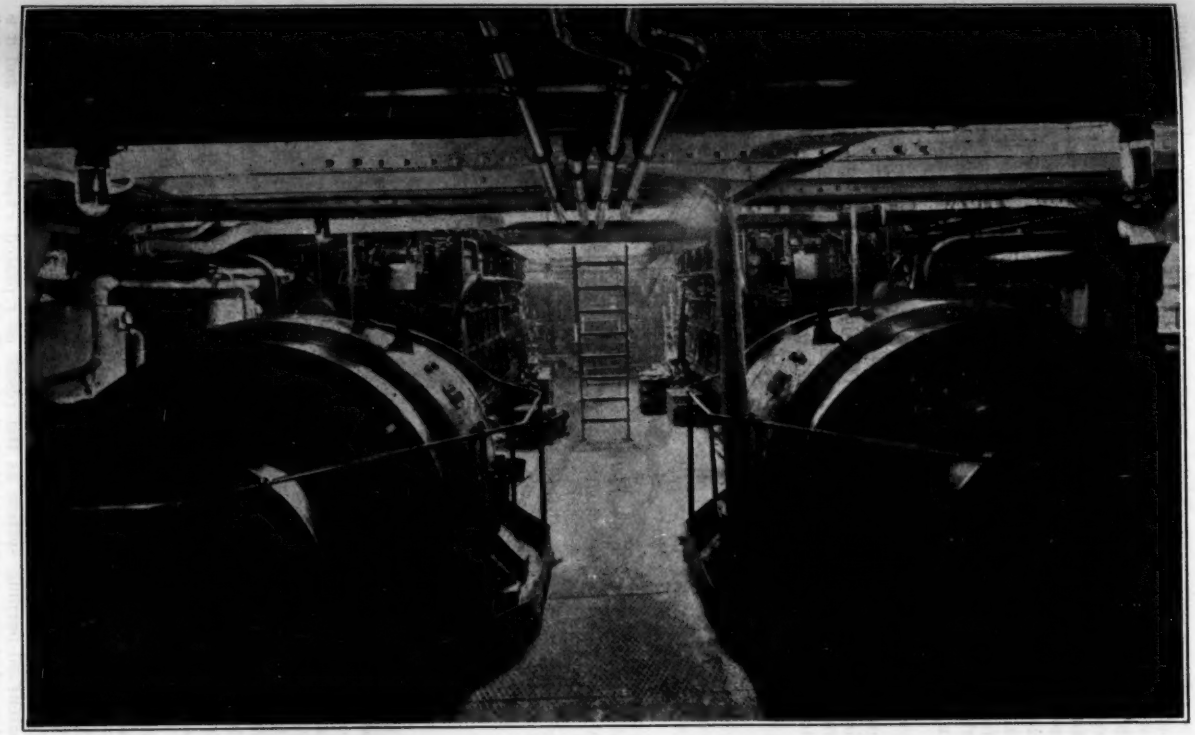
The *Pelikaan* has two complete refrigerating plants which are used for the refrigerated stores and magazine cooling.

The particular form of stem fitted to the vessel has been adopted as it serves for hoisting loads up to forty tons. The deck machinery is electrically driven and includes a winch fitted on the bridge deck at the foremast, a boat winch at the main mast, two windlasses on the upper deck and one on the forecastle. The steering gear is of the electro-hydraulic type controlled by telemotor.

The armament of the vessel consists of four machine guns and four 7.5-cm. anti-aircraft guns. Each mast is fitted with a searchlight.

Machinery

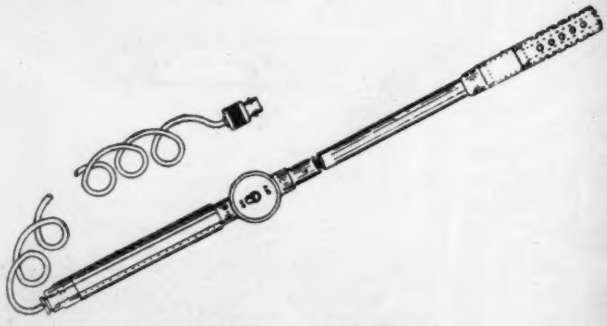
The propelling machinery of the *Pelikaan* is of the Diesel-electric type. The Maschinenfabrik Augsburg-Nurnberg supplied the Diesel engines and the Electrotechnische Industrie, Slikkerveer, the main motors. Each of the two 700 h.p. Diesel engines has six cylinders and drives a continuous-current dynamo of 468 kw. 1,200 amps. 390 volts, which supply current to the main motors, the torpedo air pumps and for charging submarine batteries. The



ENGINE ROOM OF THE "PELIKAAN," SHOWING THE M. A. N. DIESEL ENGINES AND THE MAIN GENERATORS

continuous current propelling motors are of 570 s.h.p., 380 volts, 1,200 amps. at 190 r.p.m., and each drives a three-bladed propeller. The wiring is so arranged that each dynamo can drive either motor and can also drive both motors simultaneously. The main switchboard is installed in the engine room on the port side. For driving the winches, the steering gear motor, the motors in the repairing shop, the converters and for lighting, two compound continuous-current dynamos of 32 kw. 220 volts and 145 amps. are fitted in the engine room, coupled to a 50 h.p. Diesel generator. On the awning deck a dynamo is installed driven by a 25 h.p. Kromhout motor, as a spare installation for emergency lighting and for driving the boat winch.—*The Marine Engineer and Naval Architect*, December, 1922.

LIGHTING OIL-FUEL BURNERS ELECTRICALLY.—One of the difficulties met with in the operation of oil-fired boilers on board ship is the starting up of the oil-fuel burners. The usual method adopted consists in burning some waste soaked in fuel oil underneath the burner until the temperature has risen sufficiently high to ignite the oil when it is pumped



THE WHITE ELECTRIC IGNITER

through the burner. Sometimes the oily waste gives place to some form of flame torch which has first of all to be set burning before being applied to the burners. Both of these methods suffer from the grave disadvantage that they involve the use of a naked flame in the stokehold. This is obviously accompanied by certain grave risks in view of the fact that the atmosphere in the stokehold may be laden with the highly inflammable vapors which are often given off by fuel oil, and further, there is always the possibility of oil accumulating in containers and savealls, or being spilled on the stokehold flat, and if this should accidentally come in contact with a naked flame the danger of fire is very great.

With a view to minimizing the danger of fire in the boiler room, many attempts have been made to produce a device for igniting oil-fuel burners which shall supersede the use of the naked flame, and one of the simplest and best of these which has so far been brought to our notice is the White Electric Igniter which has just been put upon the market by the White Patent Oil Burning Company Limited, of Newcastle-upon-Tyne. This igniter has been produced by the inventor of the well-known White patent oil-burning system as the result of repeated experiments, and it is claimed that it yields a practical and efficient method for igniting the oil as it issues from the oil-fuel burners. As will be seen from the drawing reproduced herewith, the igniter consists of a handle carrying an ordinary

tumbler switch, while at the other end is a heater element which becomes red hot when current is passed through it. The White electric igniter is adapted for use with the ordinary electric light circuit on shipboard, and is made for voltages of 100 to 120, which renders it suitable for use on the majority of lighting circuits found on board ship, and it is provided with a flexible cab-tyre cable carrying a plug as shown, or an adaptor so that it can be connected up to any lamp holder or to a plug connection, according to what is available. In order to ignite the burner, the heater element of the igniter is inserted in the sight-hole in the furnace door and the current switched on. The element quickly becomes red hot and, on opening the valve on the burner, the spray of oil is immediately ignited. It is stated that only a few seconds are required to bring the element to a red heat.

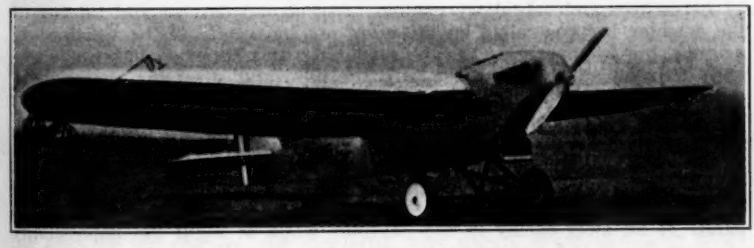
The igniter is of handy size, measuring only 3 ft. 3 in. in length overall, and it is supplied with two clips for attaching to any convenient point in the boiler room.—*The Marine Engineer and Naval Architect*, December, 1922.

AERONAUTICS

THE MARTIN OBSERVATION AIRPLANE.—A new type of "gun-spotter" for directing the fire of battleships from the air which was designed under Navy specifications by the Glenn L. Martin Company at Cleveland, Ohio, has recently been undergoing a series of tests by a trial board. According to opinions of experts in the Bureau of Aeronautics, Navy Department, the new ship gives every promise of success.

The new plane, known as the Martin Observation or *MO1*, is a three-seater monoplane with an all metal frame construction of aluminum alloy, and is designed for spotting and for short distance reconnaissance work. It is equipped with a 375 h.p. Curtiss *D12* engine.

Airplane spotting as a practical method of fire control has been thoroughly worked out in target practices held by the battleships during the past two years, but the planes used for the purpose were adaptations of



THREE-QUARTER FRONT VIEW OF THE GLENN MARTIN "OBSERVATION" PLANE

existing types and were not altogether suited to the service requirements. The Martin Observation has been specially designed to become an integral part of the fire control organization of the modern battleship and as such will have an important bearing on the accuracy of naval gunnery.

The development of a spotting plane is another step in the way of providing aircraft specially equipped and specially suited to naval requirements. Prior to the war little more was expected or required of planes than that they fly. During the war the tendency was toward the development of bombing and scouting planes to combat the submarine menace, but since the Armistice the needs of the Navy in aviation have

been the subject of careful study which has resulted in a specialized development of types. This was reflected in the *F5L* scouting planes, the recently developed *Douglas* torpedo planes, the *TS* combat planes, and now the *MO1* three-seater spotter.

To suit the varied conditions under which a naval plane must operate, the *MO* is designed for interchangeable landing gear which will make it adaptable for landing and taking off from the deck of an airplane carrier, or in place of wheels for landing and taking off pontoons may be substituted which will permit of landing and taking off from the water. The plane is also designed to be quickly assembled and knocked down for stowage in a small space, a feature that will make it particularly suited to conditions on shipboard. The all metal feature of construction insures greater life and durability, and is at the same time a measure of economy in the repair and upkeep of the aircraft squadrons of the Navy. This with its attending advantages is a direct result of investigation and research conducted by the Bureau of Aeronautics.—*Aviation,* 11 December, 1922.

PILOTLESS AEROPLANES.—A fortnight ago we noted a report from America announcing the success of tests made with a wirelessly controlled aeroplane with which the United States Army Air Service has recently been experimenting. Flights of over ninety miles were achieved, and it was claimed that the machine could be guided with great accuracy over any selected point and there caused to discharge its load of bombs. We pointed out that this performance had already been excelled by a French wirelessly controlled aeroplane in 1919, at about the time when the American experiments were being begun, and that the comparative ease with which the enemy might upset the control by "jambing" the wireless rendered the machine of very little value as a weapon of war. News is now at hand from France concerning a new form of pilotless aeroplane. Last Saturday, it seems, a demonstration was given at Etampes, on a Voisin 300 horsepower biplane, of the Percheron-Bernady system of aeroplane control. This system, as demonstrated, involves, it is understood, the use of gyroscopes and subsidiary engines. Ascent and descent and turning of the machine are controlled by the pilot, not by means of the usual wheel or stick, but by merely pressing one or other of a series of buttons. Presently it is intended to dispense with the pilot and effect the operation of the buttons pianola-wise by means of a perforated roll of paper and clockwork. Again the claim is advanced that the arrangement will add a new terror to bombing in warfare. Insofar as the machine is independent of wireless control, it is free from the form of interference by the enemy, to which we have already referred; but unless automatic fighting apparatus can be added to it, it is hard to see how it could escape destruction at the hands of an alert enemy in the daytime, while at night the impossibility of observing it and correcting its course for errors in the estimation of the drift should render its chances of striking a selected target remote in the extreme.—*The Engineer,* 1 December, 1922.

EXTENSIBLE WING EXPERIMENT.—The following news item is taken from *The Times,* London, of October 31, 1922:

M. Maneyrol, the well-known sailplane flier, has made some interesting experiments in Villacoublay over the week-end on an airplane fitted with extensible wings.

One of the most important factors which make for security in flying is the widest possible difference between the extremes of speed by which an airplane is maintained in the air. An ideal machine would be one which, while capable of a speed of 200 or 250 miles an hour, could never-

theless maintain itself in the air at a speed of six to ten miles an hour. One of the means by which this end can be attained is the extension at will of the length of the wing.

Last year the engineers, Lavavasseur and Gastambibe, constructed an airplane fitted with wings, the extremities of which could be made to disappear at will, and this solution of the problem was successfully tested at Etampes. It is a new machine constructed by Bille on the same principle, but possessing qualities of greater rigidity, which M. Maneyrol has now been testing, with the best results.

The Bille machine, after lying at 170 kilometers (105.6 miles) an hour, reduced its speed to 60 kilometers (37 miles) an hour, and then to 20 kilometers (12.4 miles) an hour, before landing. The extension and reduction of the length of the wings, which were effected at will in full flight, occupied no more than six seconds. The airplane had been handed over to the technical section of the army and will be entered for the Aero Club's safety prize.—J. B. H.

GENERAL RULES FOR AIR COMBAT.—Surprise and Attack Regardless of Consequences: The combating power of the one-seater lies in the attack. In an attack, the surprise and a fearless closing with the opponent as near as possible (less than 100 meters) before the opening of fire, play the chief part. The one-seater makes his surprise attacks, flying out of the sun, toward the enemy, or in the steepest dives.

Proper Shooting Distance

The one-seater is only at the proper shooting distance when he flies into the enemy's propeller whirlwind and constantly has the feeling that he will ram the opponent at once. At such distances the large and close target must be hit by using the gauger and sights even with aiming errors; with the employment of light tracer ammunition the position of the stream of bullets can be frequently improved. The use of the aiming telescope at such short distances is not advisable.

Firing at longer distances with the aiming telescope is solely to be used to shoot at a fleeing opponent—to force him, through short bursts at greater distances, to circle and to then cut him off while circling—or to help in time a far-away harassed comrade.

Attacking Direction

The most effective attacking direction against one-seaters is the one from above to the rear, to the rear and from the rear below. Shooting the opponent from the front is in most cases not possible with the short shot possibility due to the speed of the aeroplanes and the blanketing of the pilot by the engine. An opponent, who shoots while swooping down from a great distance, betrays the beginner or shows shyness to engage in the curve combat at a close distance. Even accidental shots are herewith rare.

Working Together

Fundamentally two one-seaters should always co-operate even in squadron formation. If one of the two attacks a hostile one-seater, his comrade does not take part in the air combat, but remains in readiness for immediate action and covers the rear back of the comrade against a surprise attack by other hostile aeroplanes. Only then is participation in the combat proper, if the opponent threatens to win the upperhand. The attacked aeroplane is, if it does not burn or break up, always closely pursued till its impact or landing. Turning away from the opponent on account of inexperience or in consequence of hostile action, even if only

for seconds, means for the comrade in the vicinity not only the right, but also the duty to take part at once. Herewith the fundamental rule remains, never to impede the curve combat of a comrade by a desire to open fire.

The Opening of the Combat

With a prompt recognition of the hostile aeroplane turn at once against it, shoot and then try in curve combat to get in the rear or underneath him (if opponent has a rotating motor turn to the right if possible).

When in doubt as to whether it is a hostile or friendly aeroplane, turn against it at once, push underneath the suspicious machine at full speed and only, if the cocard is recognized or opponent shoots, to pull high and return the fire. With a surprise attack from the rear, if there is no time to turn around, tip up steeply at once with full gas, once again pull up high and go into the curve or immediately with the most powerful rudderpush take the steepest curve.

Curve Combat

In curve combat the curve must not be changed or downward steering be given, if the opponent ascends above. Herewith there is still the possibility of shooting the opponent from below, as it is not at all advisable, to go above an aeroplane, which can shoot upwards. The curve combat itself is always led with full gas. If the one-seater perceives, that in spite of his efforts the enemy will come behind him because of greater turning ability of his aeroplane or flying superiority, then quickly overdraw the machine in the curve, whereupon it stands at once on its head, turns three to four times quick as lightening round its own axis, and catches itself again on its own accord after a sudden fall of 100 meters at the most. The pursuer is in this way always shaken off for some time.

Rear Cover

The one-seater operating alone over hostile territory is easy to combat, when fearlessly attacked, as he lacks the rear cover on the one hand, and on the other hand must strive again to reach his lines. Therefore, with attacks on captive balloons and in squadron combats beyond the front, constant teamwork is absolutely necessary. This supplies the necessary defense for the rear attack. Frequent practice is, however, necessary.

Combat of the One-Seater against Hostile Double-Seaters

Herewith too, the surprise plays the chief part on our side and on the other side of the lines, besides making possible a quick rush across the danger zone of the enemy's movable machine gun. Suddenly push down in the steepest drop without shooting, place oneself at once behind or underneath the enemy and only at the last moment operate both rigid machine guns. A flat straight-ahead flight with an attack on the body of the double-seater is absolutely to be avoided. It is wrong to shoot in an attack at distances of over 100 meters and if the opponent answers the fire, to turn. In this moment the enemy is offered a target which is easily hit and without danger to him.

Combat of the Double-Seater against Hostile One-Seaters

With early recognition of the opponent give the observer notice, while still at a long distance, by short fire bursts, so that he will not be surprised (thus saving ammunition). If the hostile one-seater attacks, then curve with full gas and bring observer into position to shoot.

In case of doubt, whether it is a hostile or our own aeroplane, curve toward it, press underneath it with full gas and, if the enemy is recognized, bring observer into position to shoot from beneath to above.

With a surprise hostile attack at once curve steeply with most powerful rudder stroke, bring the observer into position to shoot. It is fundamentally wrong, to fly straight ahead or—when with shut off gas—to go straight ahead downward.

The German reconnoitering aeroplane attacked by hostile one-seaters far beyond the line rids himself best of his bothersome opponents, by flying constantly zigzag, as long as the enemy attacks, thus bringing the observer into position to shoot. If the pursuer is lost out of the line of sight for a moment the German double-seater then at once pushes away under full gas and takes advantage of the high speed of the heavy aeroplane. Generally the pursuer does not succeed in overtaking a second time and approaching in an effective distance (50 to 100 m.). Should the one-seater still follow, shooting at 4 to 500 meters, then do not curve nor return fire, but first, quickly put in new drums, turn, push beneath the pursuer and to bring observer in closest distance to shoot upwards. Fundamentally the most dangerous one-seater is the one which tries to get underneath the tail of the double-seater.

Combat of the Double-Seater against Hostile Double-Seater

Here the movable machine gun of the observer brings the decision. The task of the pilot herewith is, to bring his observer as often as possible into position to shoot and to curve in such a way that the opponent is offered no aim. An attack of the double-seater with the rigid machine gun will often stupefy the opponent. On our side of the lines the double-seater has also the duty to attack as well as to take part in the air battle of German one-seaters in the vicinity.—Abstracts from a Post-war Paper on Pursuit Aviation by an Expert German Pilot.

ORDNANCE

TARGET PRACTICE BY ANTI-AIRCRAFT TROOPS—Anti-aircraft troops established an enviable record for efficiency in recent firings at Fort Monroe, Va., when the troops of the 61st Artillery Battalion (Anti-Aircraft) placed five shots within destructive range, out of twenty-two fired, at a target towed by a seaplane from the Hampton Roads Naval Air Station. This was the first time in the history of the American Army that firings have been conducted on a target towed by an airplane. The results accomplished mark a new era in the development of the American system of anti-aircraft defense, for it has been demonstrated that a target can be towed by an airplane for anti-aircraft target practice without danger to the pilot.

The target was in the shape of a sleeve, three feet in diameter and fourteen feet long. It was towed through the air at a speed of 60 to 80 m.p.h. by a cable 2,500 ft. long, which was fastened to Lieutenant Patterson's plane. Eight courses were flown from Rip Raps to Back River light, at altitudes varying from 5,000 to 7,444 ft. The sky was overcast and the target, which at times was obscured by clouds, appeared scarcely as large as a lady's stocking.

The anti-aircraft troops opened fire with both 3-in. guns and machine guns. The average range for the firing was 3,000 yd. While this is greater than the effective range of the machine guns, which were placed on special anti-aircraft mounts, excellent marksmanship was displayed as indicated by the use of tracer bullets which showed the line of fire to be through the target at practically all times.

That there is no danger for the pilot of the plane towing an aerial target, provided the gunners are well trained, is shown by the fact that although the tow line was 2,500 ft. long, the shot which came closest to the plane during the entire flight was 2,200 ft. behind the aviator. As

the seaplane used is much heavier than the average land plane which would be used for towing, and not so easily maneuvered, it is believed that any objection which aviators may have to towing targets for anti-aircraft firing has been overcome as the result of these tests.—*Aviation*, 11 December, 1922.

AMPHIBIOUS ARMY TANK.—An armored truck, with a three-inch regulation field gun mounted forward, traveled at the rate of twenty-five miles an hour on Riverside drive, New York city, negotiated the lower slope of the Palisades on the other side of the Hudson, and then crossed the river under its own power, in a test conducted December 6.

The demonstration was attended by Army and Navy officers and by several hundred members of the American Society of Mechanical Engineers who were attending the forty-third annual meeting of the organization. The truck was invented by Walter Christie, former driver of racing automobiles and designer of various sorts of gasoline motors.—*Army and Navy Journal*, 9 December, 1922.

SMALL ARMS FIRING REGULATIONS.—The Board for the Revision of Small Arms Firing Regulations has completed its work and is now engaged in preparing its report. The report will standardize the methods of firing and will provide for the proper firing courses for qualification made necessary by the new pay bill. The new regulations will greatly simplify the keeping of records and will probably eliminate all paper work.—J. B. H., 4 December, 1922.

NAVIGATION AND RADIO

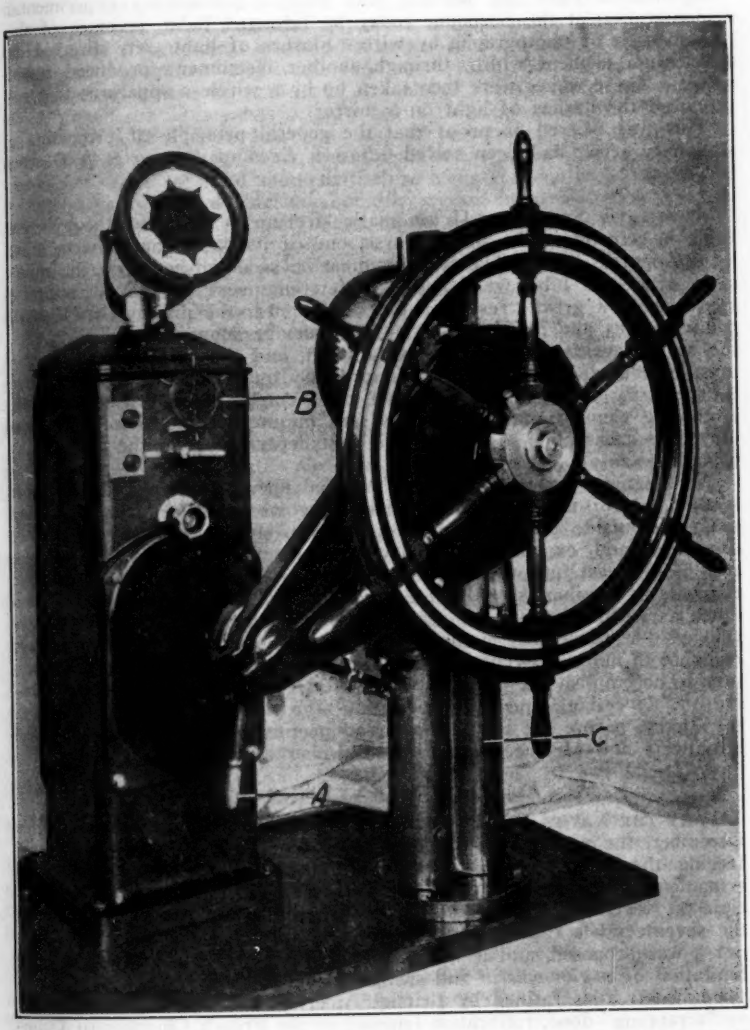
TO TEST NEW SOUNDING DEVICE IN PACIFIC.—Final plans are being completed by the naval authorities to dispatch two destroyers from San Francisco on an extensive tour to chart the bottom of the Pacific with the new type of sounding device, which operates on the principle of the speed of sound. A sound is sent from the apparatus to the bottom of the ocean and echoes back to the ship. The elapsed time is a measure of depth.

By this method efforts will be made to ascertain the depth of Nero's Deep, in the South Pacific. Nero's Deep is a hole in the floor of the ocean believed by many to be the opening of a tunnel connecting the Indian and Pacific Oceans. The deep has frustrated the effort of 25,000 fathoms of cable to reach its bottom.—*Army and Navy Register*, 25 November, 1922.

TWO KINDS OF FOG AT SEA.—"The physical condition of the South Atlantic during summer," by R. C. Mossman, is a valuable paper of a heretofore practically unknown region. In reviewing this for the *Monthly Weather Review*, H. H. Clayton has the following to say about the discussion of fogs:

"In regard to the fogs in that region he says, 'When a warm wind blows over cold water, the fog is generally very dense near the surface of the water, but has very little height, and occasionally it is possible to see over it from the masts of a ship. On the contrary when a fog is produced by the passage of a cold wind over water at a higher temperature the fog extends to much greater heights, but the base does not always reach the earth's surface; so that the visibility from the deck of a ship is very different in the two cases'."

The monograph was published by the Argentine meteorological bureau in 1922. It contains a number of maps and wind-rose charts.—*Bulletin American Meteorological Society*, November, 1922.



UNIT SYSTEM STANDING NEAR THE STEERING WHEEL AND TELEMOTOR *C*, *A* THE HANDLE FOR THROWING ON AND OFF, *B* LITTLE TILLER WHEEL FOR SETTING COURSE AND STEERING SHIP THROUGH AUTOMATIC

SEEING BY WIRELESS TESTED IN PARIS.—Paris, Dec. 1.—Tele-vision, or "long-distance sight" by wireless was given a preliminary experimental demonstration at the Sorbonne today by Edouard Belin, inventor of the transmission of photographs by wire. Flashes of light were directed on a selenium element which, through another instrument, produced sound waves. These waves were then taken up by a wireless apparatus that reproduced the flashes of light on a mirror.

This was offered as proof that the general principle of projecting a stationary scene had been solved.—*Boston Evening Transcript,* 1 December, 1922.

AUTOMATIC STEERING.—If automatic steering is to be of the greatest value in controlling the ship's course, one of its paramount objects must be to suppress helm. The steering must be accomplished with the minimum of helm. I believe that only a few engineers and naval architects appreciate how great a resistance can be offered to the ship by even a small rudder angle, and it is this angle that must be suppressed. To do this, the act of anticipation becomes paramount, and the correction to course must be introduced long before an ordinary quartermaster would realize the necessity for change. This fact alone emphasizes the importance of a guiding element that is instantly and minutely responsive, to be employed as a base line so that the slightest departure from the course may be utilized to apply the correction.

No magnetic compass can ever be relied upon to do this. So difficult is this part of the performance that some workers have felt that they must go outside the gyro compass and introduce a quantity of highly organized and expensive auxiliary mechanisms for accomplishing the result. At least one worker has proposed to employ intricate gyroscopic elements as auxiliaries. All of these have been found unnecessary, inasmuch as within the last ten years ways and means have finally been developed that prove that in the gyro compass alone, with its instantaneous response to minute deviations of course, we have everything that is necessary to accomplish the purposes most effectively, even including the "easing off," "meeting," and full anticipation.—Extract from address by Elmer A. Sperry, before the thirtieth general meeting of the Society of Naval Architects and Marine Engineers, November 8, 1922.

MISCELLANEOUS

WHY THE NAVIES DO NOT MELT AWAY.—Each evening, a year ago this December, the papers told of some new progress at Washington toward freeing the world from the crushing burden of ever-increasing naval armaments. The Hughes proposals had been made and accepted in principle in November. On December 15 Japan accepted the 5-5-3 ratio; on the seventeenth a capital ship ratio of 1.75 for France as compared with our 5 was proposed, and it was accepted by France two days later. The limitation of navies was in full swing. Mid-December a year later shows the naval treaties ratified by Britain, America and Japan, but practically no "scrapping" done, ratification opposed in the French Chamber of Deputies, and the American Secretary of the Navy now insisting emphatically on our need of a Navy "second to none." In the French failure to ratify, the Baltimore *Evening Sun* sees the application of "the final quietus on the whole disarmament proposal." "The 5-5-3 ratio of navy building remains a dead letter," remarks the Washington correspondent of the New York *Call,* "in the face of England's unwillingness to be outdone by France, the French fear of Germany, Italian national pride, Japanese imperialism, and American democracy and equality with the other autocratic Powers." Yet the Philadelphia *Evening Public Ledger* sees hope

in the fact that "the United States, Japan and Great Britain have clean records so far as the Washington covenants are concerned."

What can we learn from the dispatches and editorials about the present status of disarmament and the possibility of fulfilment of those hopes which were so bright in December of last year? So far as our own Government is aware, we read in an Associated Press dispatch, no country which signed the Treaty has actually begun to scrap warships. The only real effect the Treaty has had is to suspend new capital ship construction in the United States and Japan, Great Britain having no ships under construction. We have heard about battleships being reduced to scrap iron in this country, Japan and England, but this, we are informed, "has affected only vessels which are formally classified by each Power as wholly obsolete for naval purposes."

Alarm is professed by *The Army and Navy Journal* over Japan's naval estimates. It sees Japan, in spite of the treaties, taking from us the position of world's second naval Power:

"We have put great numbers of valuable 'Treaty Navy' ships out of commission; a status in which but a handful of caretakers remain on board; so few as to be incapable of preventing rapid and serious deterioration. About 300 of the ships of the American Navy are now at docks in this condition.

"Nothing of the sort has been done in Japan. Her full quota of personnel renders such drastic measures unnecessary. We refrain from projecting any new ships. Japan's new building program comprises more than fifty new cruisers, destroyers, submarines and other types, all of a long range, essentially offensive type not at all necessary for her defensive needs as outlined in the Conference."

On the other hand, a Tokyo dispatch recently contained the information that the Tokyo and Washington Governments had exchanged assurances that their respective naval budgets would conform to the Treaty. And the Indianapolis *Star* gives the Japanese credit for observing the spirit of the limitation treaties in getting out of Siberia, Shantung, and Sakhalien; in abolishing the naval port of Port Arthur next month; in promising to convert the naval base of Malzuru into a naval station next April; in dropping more than 12,000 men from the Navy personnel on December 1; and in proceeding to scrap three battleships.

A British Admiralty official announced at the end of last month that "eight British capital ships have been rendered useless for war purposes," six more made "incapable of war risk service," and two more will be "similarly dealt with" by the end of December. But he concludes: "Now that Great Britain's intentions have been shown, we undertake that no more ships shall be dealt with until the other countries have acted." The Washington understanding of what Great Britain has done under the Treaty, however, is stated as follows by the Associated Press:

"The British Government had placed contracts for two super-*Hoods* just before the Conference met, and canceled these contracts when the agreements were first reached. So far as known here, this cancellation is the only 'scrapping' of war vessels under the Treaty which has been carried out by the British."

In France the naval Treaty has had hard sledding of late in the Chamber of Deputies, the Foreign Affairs Committee having voted against recommending ratification. The chairman of the committee has been quoted as saying that, "If ever we approve it there will be so many vital reservations to the Treaty that it will not be recognizable." The present French attitude brings criticism from the New York *Times*, Dayton *News* and Buffalo *Express*. But *The Army and Navy Journal* accepts the French view that sea power greater than that allowed by the Washington Treaty

is essential to France to enable her to draw on her colonies for troops in case of war.

Our own Secretary of the Navy, in his recent report, points out that the United States, by letting its Navy personnel decrease, and by failing to build non-capital ships which are not affected by the Treaty, is allowing its Navy to drop below the equality with Great Britain's which the Washington arrangements call for. While Mr. Denby does not expect Congress to make any additional appropriations at present, he does call for such an increase eventually "as will tend to balance our fleet and keep it the equal of any in the world."—*The Literary Digest,* 16 December, 1922.

SCRAPPING DELAYED BY U. S. AND JAPAN.—Washington, December 19.—Responding to a House resolution, Secretary Denby transmitted to Congress today the information in the hands of the Navy Department on the status of warships scrapped under the terms of the Washington Arms Conference naval treaty or otherwise disposed of by the signatories since the adjournment of the Conference.

The report showed that neither the United States nor Japan plans to complete the scrapping of any existing capital ships, at least pending promulgation of the treaty, although both nations have stopped work on large building programs of capital ships. Great Britain, on the other hand, was shown to have disposed of or to be disposing of a very considerable number of older capital ships.

U. S. Has Sold Two Ships

The United States, according to the report, in addition to suspending work on vessels under construction under the treaty, has decommissioned all completed ships affected except the battleship *Connecticut,* which soon will be placed out of commission, and has sold the *Maine* and the *Missouri,* which actually are being broken up.

Great Britain, Mr. Denby said, had at the time his information was gathered, but which was not indicated, broken up three capital ships; sold to be broken up, seven; sold but not dismantled, one; completed mutilations on two and was engaged in mutilating six others. The Australian Government, he added, had decided to scrap the battle cruiser *Australia.*

Japan Does Preliminary Work

Through her Ministry of Marine, the Secretary continued, Japan "had stated that while work preliminary to scrapping will be done, the hulls will not be broken up or sunk until the treaty has been ratified by all the powers." Certain preliminary work involving removal of guns, turrets, armor and engines was being done, he said, on seven capital ships, three others had been placed in the fourth reserve and work had been suspended on six. Work on two others was proceeding with the evident intention of completing them as aircraft carriers, permitted under the naval treaty.

Neither France nor Italy was required to scrap any completed vessels by the treaty. One of the ships France was permitted to retain, Mr. Denby said, had been wrecked and that nation proposed to complete, as an aircraft carrier, one of the five battleships it had under construction at the beginning of the war.

One Ship Sold By Italy

Italy, Mr. Denby said, had disposed of one battleship under construction and had annulled contracts for three others. In addition, the *Leonard Da Vinci,* a battleship permitted under the treaty, had been wrecked and would not be reconstructed.

Discussing ships not affected by the treaty, Mr. Denby said the United States had disposed of twenty-five submarines, one destroyer, two monitors and one dynamite gun vessel. Great Britain, he added, had lost three auxiliaries by sinking and had disposed of thirty-eight lighter vessels, including twenty-four submarines. One Japanese battleship, he continued, and thirty-three smaller vessels had been removed from the effective list, and one light cruiser had been wrecked. France had disposed of one battleship, four cruisers and nine torpedo boats.—*Baltimore Sun*, 20 December, 1922.

BRITISH AND FOREIGN FLEET REDUCTIONS.—So far as can be ascertained, Great Britain is the only Power which has begun to carry out the scrapping of important ships condemned under the Washington compact. Not one of her Dreadnaughts in that category now remains in an effective condition. Some have already been broken up in home or foreign yards; others are partially demolished, and the remainder, stripped of all fighting equipment, will be reduced to scrap metal as soon as the shipbreakers are ready for them. The vessels thus discarded range from the original *Dreadnaught* to the 13.5-in. gun ships of the *Thunderer* class—the nameship of which has been reprieved for a few years by the sacrifice of the *Erin*—and include six battle cruisers. The total of all-big-gun ships already scrapped or dismantled amounts, therefore, to seventeen.

Nothing equivalent to this wholesale destruction of really valuable material is reported as yet from either the United States or Japan. According to a recent communiqué by the Japanese Embassy in London, the 12-in. armament and the turrets of the battleships *Kashima, Ikoma,* and *Kurama* have been dismantled, but these three vessels are, of course, pre-Dreadnaughts, which would in any case have disappeared shortly on the grounds of obsolescence. The communiqué adds that the *Kaga* and *Tosa* are to be used for target practice before they are broken up, and that "all the capital ships to be scrapped have been relegated to the fourth Reserve Fleet, and preparations are practically completed for the work of demolition on the majority of them." It is clear from this that the work has not actually been started. Apart from uncompleted ships, the most important units to be broken up are the semi-Dreadnaughts *Aki* and *Satsuma* and the Dreadnaught *Settsu*. These vessels, it would appear, remain intact for the time being. It is, in fact, most unlikely that any of the Japanese all-big-gun ships, whether complete or incomplete, will be handed over for demolition until the Washington treaty has been fully ratified.

The same cautious policy is, it would seem, being pursued in the United States. The latest news from Washington gives no indication of breaking-up operations having started on the surplus Dreadnaught fleet. The thirteen unfinished ships earmarked for scrapping remain on the stocks in the condition in which they were left when work upon them ceased some eleven months ago, and no orders have been given to dismantle any of the four completed vessels doomed by the treaty: viz., *Michigan, South Carolina, Delaware,* and *North Dakota*. As regards pre-Dreadnaughts, the majority, it is true, have been withdrawn from service, but it is doubtful whether all of them have been rendered ineffective. Moreover, it has been intimated pretty clearly that definite orders for the scrapping of useful ships surplus to the treaty standard will not be issued until and unless that document has been ratified all round.

These facts imply no reflection on the good faith of either the American or the Japanese Governments, both of which are entirely within their rights in postponing the operation of a diplomatic agreement which has not yet received the final assent of all the signatories. They do mean,

however, that in the event of the treaty breaking down owing to non-ratification in one quarter or another, both the United States and Japan would be able to resume the development of their respective navies practically at the point where they left off, having rid themselves in the interval only of such obsolete material as would have been scrapped, or at least placed in reserve, in the course of a year or two. Great Britain, on the contrary, would find herself bereft of a number of really valuable ships, which but for the agreement would most probably have been kept in the service for several years to come. Opinions may differ as to the wisdom of the somewhat precipitate action which has been taken with regard to the scrapping of the early Dreadnaught fleet. The fact remains that these ships have been relinquished without any corresponding reduction having taken place in the strength of foreign navies.

It is difficult to obtain precise information respecting the weeding out of obsolete material in the Continental navies. France was reported not long since to be scrapping, or preparing to scrap, a considerable number of her older ships. Among those mentioned as condemned were the cruiser *Jurien de la Gravière,* launched in 1899, the machinery of which is said to be worn out as the result of continuous steaming at high speed when she was running as a despatch vessel between Toulon and Malta during the war; the *D'Estrées,* a smaller ship, also dating from 1899, which, it is understood, will be replaced on the China Station by the *Colmar* (ex-German *Kolberg*) and the old *Lavoisier,* which is apparently still effective, though her name has disappeared from the textbooks. Italy, according to the latest semi-official lists published in that country, has scrapped scarcely any of the war vessels that she possessed at the close of the war, and is even retaining such nondescript craft as the floating batteries (*Grappa, Monte Santo, Faa' di Bruno,* etc.) which were built for coast defense and bombardment purposes. Nearly all the old destroyers and torpedo-boats continue to figure in the list of effective material. Nowhere, therefore, is there any counterpart to the ruthless scrapping which has gone on in Great Britain since the armistice.

The French papers have published illustrations of the submarine *Requin,* now under construction at Cherbourg. She is one of the batch of six 1,200-ton boats voted in the first post-war program, which also includes six boats of 600 tons. One view, evidently taken a few weeks back, shows the *Requin* to be well advanced, with her inner hull practically complete. Although a fairly large boat, the *Requin* is by no means the heaviest submarine now building. The *K 26,* completing at Chatham, is larger by about 680 tons; Japan has several 1,500-ton boats in hand, with larger ones in contemplation; and the United States is building three "fleet submarines" of 2,025 tons. On the whole, however, such underwater craft as have been laid down since the war are not as large as might have been anticipated, and with the possible exception of the latest Japanese boats—details of which are vague—no Power has yet laid down a submarine comparable in dimensions to the German "Untersee-Kreuzer" *No. 124.* The largest submarine actually in commission today is the French *Halbronn* (ex-German *U-139*), which displaces 1,930 tons on the surface and 2,480 tons submerged. One reason why the dimensions of these craft are being kept within fairly modest limits is the formidable cost of larger boats. Nowadays it would tax the financial resources of any nation to build a fleet of submarines equivalent in size and power to the *U-142,* nor is it by any means certain that these very large boats have a military value proportionate to their cost.—Hector C. Bywater in *The Naval and Military Record,* 22 November, 1922.

FURTHER NAVAL LIMIT PROPOSED.—Washington, December 16.—The sentiment of the House of Representatives concerning the pending proposal to authorize President Harding to negotiate with Great Britain, France, Italy and Japan with a view to an international agreement limiting the construction of military ships and submarines of less than 10,000 tons and aircraft was indicated this afternoon by the adoption of a special rule by which this proposal was made "in order" as part of the Naval Appropriation bill. The special rule was adopted by 251 to 9.

The object of the rule was to prevent the elimination of the proposal from the naval measure. As new general legislation the proposal under the rules of the House has no place in an annual appropriation bill, and a point of order against its incorporation in the bill had been made. While the House merely corrected a technicality, the heavy vote is indicative of the desire of a large majority of the membership to have the proposal considered.

Disarmament Move in Senate

Another move in the interest of reducing armaments was made in the Senate this afternoon by Senator King of Utah. He offered a resolution proposing an international conference to consider the reduction and limitation of armament on both land and sea. The resolution follows:

"Be it resolved that the President is hereby authorized and requested to invite the Governments with which the United States has diplomatic relations to send representatives to a conference to be held in the City of Washington, which shall be charged with the duty of formulating and entering into a general international agreement by which armament for war, either land or sea, shall be effectually reduced and limited in the interests of the peace of nations and the relief of all nations from the burdens of inordinate and unnecessary expenditures or the provision of armaments and the preparation of war."

Senator King made no remarks in presenting the resolution. It was referred to a committee.

The proposal for limiting the construction of warcraft under 10,000 tons is the last paragraph of the Naval Appropriation bill, reported to the House by the Committee on Naval Affairs. This paragraph reads as follows:

"The President is requested to enter into negotiations with the Governments of Great Britain, France, Italy and Japan with the view of reaching an understanding or agreement relative to limiting the construction of all types and sizes of sub-surface and surface craft of 10,000 tons standard displacement or less, and of aircraft."

Comparison of Strength

The Navy Department has sent to the House Naval Committee tables containing data regarding modern combatant ships whose numbers are not affected by the naval treaty negotiated at the Washington Conference on limitation of armaments and ratified by the Senate. These tables are for the committee's use in connection with the naval bill proposal.

It is shown by the tables that the United States has no first line cruisers of 8,000 tons or more capable of twenty-seven knots speed, while Great Britain has four, with a tonnage of 56,700, Japan has no vessels of this type. Nor has the United States any first line light cruisers of more than 3,000 tons and capable of twenty-seven knots speed, while Great Britain has forty of these and Japan has ten.

Both Japan and the United States are lacking in "flotilla leaders" of more than 1,500 tons, but Great Britain has sixteen of them.

Of first line destroyers, from 800 to 1,500 tons, the United States has 281, against 185 for Great Britain and 53 for Japan. Neither Japan nor

Great Britain has any light mine layers, but the United States has fourteen. Fifty-nine first-class submarines of from 500 to 1,000 tons are owned by the United States, against thirty-six by Great Britain and twenty-eight by Japan.

Fleet submarines of more than 1,000 tons and capable of more than twenty knots speed number three in the American fleet and six in the British fleet. Japan has none. Great Britain has seven mine-layer submarines, but none of this type is owned by Japan or the United States. Great Britain has also three first line monitors, a type not now found in the United States and Japanese navies, and she also has three monitor submarines, with none of this type to the credit of the United States or Japan.

In aircraft carriers of the first line the United States is lacking but has one aircraft carrier of the second line. The construction of aircraft carriers is limited by the naval treaty. Great Britain has one aircraft carrier of the first line and three of the second line. Japan has one aircraft carrier of the second line. The tonnage of aircraft carriers permitted under the naval treaty is 135,000 each for Great Britain and the United States and 81,000 for Japan, but aircraft carrier tonnage of the United States is now only 12,700, of Great Britain 43,700 and of Japan 9,500.—*New York Times*, 17 December, 1922.

WEAKNESS IN OUR NAVY.—Washington, November 19.—If the American Navy is to achieve and maintain the 5-5-3 ratio laid down at the Disarmament Conference, and if it is to have sufficient fighting strength to insure the safety of the nation in the future, it must—

Convert two partially completed cruisers to aircraft carriers and build a third one.

Build twenty 10,000-ton criuers with maximum armament permitted by the Naval Treaty, and

Build twenty-four powerful submarines with the greatest possible armament and radius of action.

This is the conviction of Rear Admiral William L. Rodgers, chairman of the executive committee of the General Board of the Navy and a late member of the Advisory Council of the American delegation to the Arms Conference.

"As passed, the naval treaty," said Admiral Rodgers, "applied only to capital ships and airplane carriers. In all other classes of ships of war there is no limitation. The American proposal of last winter had the actual status quo as its chief basis, although not rigidly adhered to.

"The treaty was very specific as to capital ships: When the United States shall have completed the *Colorado*, and the *West Virginia* and scrapped the *North Dakota* and *Delaware*, and when Great Britain has completed the two new 35,000-ton ships, the construction which will be undertaken, so their Admiralty announces, in the near future, and has scrapped four ships of the *King George V* class, the capital ship tonnage will be:

United States	525,850
Great Britain	558,950
Japan	301,320

"In so far as capital ships go," the admiral continued, "the United States has, by the treaty, only a small inferiority of tonnage, and of four ships in number as compared with Great Britain, and is one and two-thirds that of Japan. The inferiority with regard to England will be reduced as time goes on by the disappearance of the other ships."

Taking up the matter of aircraft carriers, which are becoming more and more important, the admiral said:

"The treaty provided a maximum tonnage of aircraft carriers as follows:

United States	135,000
Great Britain	135,000
Japan	81,000

How Aircraft Problem Looks

"The United States may convert two of the partially completed battle cruisers to aircraft carriers, if it so desires. At present the three powers have in commission or under construction or authorized, the following aircraft carriers:

United States	1 vessel,	12,700 tons
Great Britain	6 vessels,	82,550 tons
Japan	3 vessels,	29,900 tons

"In view of the growing importance of aviation as an indispensable auxiliary to a fleet, it is not to be supposed that Great Britain and Japan will fail to build up to the tonnage allowed. To maintain equality the United States should, therefore, at once proceed to the conversion and completion of aircraft carriers of two partially completed battle cruisers and at least one additional aircraft carrier of 27,000 tons."

Discusses Cruiser Situation

Dealing with the question of cruisers, another phase of naval strength that is of importance, the admiral said:

"The cruiser tonnage allowed the various powers is unlimited. In instituting comparisons and estimating our needs, we must exclude all old vessels of less than 27 knots speed. The apparent situation will alter from year to year, according to the progress of the various building programs.

"At present the best information indicates there are in existence, building or authorized for the three years, the following tonnage in cruisers of 27 knots or above:

United States	75,000
Great Britain	252,000
Japan	176,400

"Our cruiser tonnage is, therefore, 177,990 below that of Great Britain. To have one and two-thirds the tonnage of Japan, we need an additional 219,000 tons of cruisers."

Question of Destroyers

Considering the question of destroyers, the admiral pointed out:

"The United States is decisively superior to Great Britain and Japan in destroyers, due to our emergency war program to combat submarines. The destroyer tonnages are:

United States	334,917
Great Britain	247,546
Japan	104,960

"It should be noted that at present the United States has only 126,360 tons of destroyers in commission. The remaining 207,000 tons is out of commission because there is no personnel to man them. The delicate high-pressure machinery of these vessels is much more susceptible to deterioration when out of commission than when there is a crew on board to care for it. If this condition lasts a few years longer we cannot count on destroyer strength of much more than the vessels that are kept in commission.

Limitations of Destroyers

"It may, perhaps, seem that our excess destroyer strength offsets our deficiencies in cruisers. This is not wholly true. Destroyers have not the armament, radius of action, nor ability to make speedway in a seaway to enable them satisfactorily to perform the indispensable functions of cruisers in wartime."

Taking up the matter of submarines, the admiral continued:

"In comparing submarines, they must be treated in two classes; small boats and large boats. The first class (1,000 tons or less) are limited by their small size and radius of action chiefly to a coast defense rôle. Their importance will probably diminish with the development of aircraft for this purpose.

"Boats over 1,000 tons are susceptible of great development and consequent usefulness. They can be given adequate armament and great radius of action, thus rendering them to a degree independent of shore bases. They can be used offensively against an enemy without resorting to the horrors and ruthlessness employed by the Germans in the late war.

Gives Tonnage of Submarines

"The tonnage of small submarines in existence, building or authorized by the three Powers, is:

United States	66,695
Great Britain	40,253
Japan	42,714

"It will thus be seen we are considerably in excess of Great Britain, but some 5,000 tons below our ratio when compared with Japan. When we compare large submarines (over 1,000 tons for fleet use) we find:

United States	9,693
Great Britain	19,960
Japan	32,655

"To attain equality with Great Britain, we require an additional 10,000 tons, while to reach one and two-thirds the strength of Japan, we require an additional 45,000 tons."—*Baltimore Sun*, 20 November, 1922.

INFLUENCE OF AIR RECONNAISSANCE ON STRATEGY AND TACTICS

IX. NAVAL INFORMATION.—In reading the accounts or histories of modern naval engagements, the predominant impression left on the mind of the reader is the surprising ignorance of the enemy's position and of his movements under which commanders labored. Even in regard to the dispositions of his own forces the naval commander is often uncertain, as witness the action in the Heligoland Bight, August 28, 1914.

Naval battles have hitherto been fought under conditions which it is difficult for the landsman to imagine. The latter can hardly visualize an engagement in which the commander is only vaguely aware of the strength and locality of his enemy; but then a military engagement does not take place between widely separated combatants moving at high speeds. A landsman, however, could give a reason, and a not inaccurate reason, as to why the naval engagements of the late war, with the exception of those with von Spee's squadron, bore that indecisive character which the traditions of Trafalgar and of the Russo-Japanese war would hardly have led one to expect.

That reason is—lack of information about the enemy.

To fight a successful battle, and it does not matter whether the battle is on land, on sea or in the air, a commander must know the enemy's

locality, his strength, his dispositions, his movements and his losses. Without a knowledge of these, he will certainly not fight with success, and it is more than probable he will be defeated. The modern naval commander has not had all this information; in some cases he has not had any of it. It would, therefore, be safe to assert that the methods hitherto employed to obtain information are not a success; other means of obtaining information must be found. It is obvious that there is little use in spending vast sums of money in building gigantic battleships, if, when the occasion arises, these craft are unable to find the enemy in order to deal him the blow which their strength renders possible. Again there is little use in fitting these vessels with super long-range guns with which to open fire on the enemy at great distances, unless a means is found of bringing the fire of these great guns to bear on the enemy with accuracy.

The lesson of the biggest naval engagement of modern times is that the methods of reconnaissance and observation of fire then employed were inadequate; the aeroplane must be substituted for these methods. With adequate air observation it would have been impossible that the Grand Fleet should have passed over the spot where the retreating High Seas Fleet had been an hour previously and yet have been unaware of the proximity of the latter, as in fact happened immediately after Jutland.

X. THE ACQUISITION OF INFORMATION. PAST AND FUTURE METHODS.—As on land, information about the enemy is the foundation of all ideas and actions in naval warfare. Prior to the lessons taught by the late war it was assumed that this information could be acquired by:

(*a*) Espionage.
(*b*) Cruisers
(*c*) Submarines.

Espionage plays an even more important *rôle* in naval than in land warfare, for it was through the medium of espionage that the following was formerly discovered:

i. The exact location at their bases of the units comprising the enemy's fleet.
ii. Information as to any subsequent changes.
iii. Departure and arrival of enemy submarines.
iv. Departure and arrival of enemy merchant vessels.

Prior to the advent of the aeroplane none of this information could be obtained by any but the above means, though submarines might furnish irregular reports as to the latter.

Cruisers were relied on to furnish information as to the strength and disposition of the enemy fleet at sea, especially immediately preceding battle; but their necessarily inferior armaments limits their approach to the hostile fleet, with a consequent deterrent effect on the value of their information. In fact the cruiser was in very much the same position as that in which the cavalry found itself in the opening stages of the war, as explained in Part I., Section 2. It is not, however, intended to indicate that cruiser reconnaissance is valueless, but rather is it suggested that more detailed information can now be obtained far more quickly, and at less risk, by means of new methods—chief of which is the aeroplane. Under certain conditions cruiser reconnaissance may still be necessary, but it would nevertheless be safe to assert that, granted efficient air forces are available, the energies of the light cruiser may be directed into profitable channels: *e.g.*, commerce raiding, commerce protection, and fleet protection.

Submarines.—It has been said of the submarine that "it is the ideal sea scout, because it can evade the enemy's outer guard, and ascertain from close quarters his real inner strength or weakness; can wait and watch quite

unknown to the enemy; and at the same time it can, if occasion offers, deliver an attack on the largest warship with reasonable chances of success."[1]

That the submarine has obvious advantages as a slow but certain medium of reconnaissance is beyond doubt, and if, as Mr. Domville-Fife suggests, it could make its observations unknown to the enemy, its value would be largely increased. But can the submarine make its investigations unobserved by the enemy anti-submarine reconnaissance aircraft? The same author admits in an earlier stage of his book that the most deadly enemy of the submarine will be the heavily armed aeroplane or seaplane. If this is true it is hardly safe to count on the submarine as a secret method of watching the enemy.

That the submarine can deliver an attack against the largest warship, while lying to off an enemy base, is also true, but this is a combination of offensive and reconnaissance duties which can also be done in the case of aircraft. Experience, however, teaches that such a combination of duties does not produce the best information, be it on land, on sea or in the air.

The chief objection to submarine reconnaissance is the slowness with which the information will reach its destination. Information, to be of value, must be early, and this the submarine cannot supply. It can, of course, report by wireless, but this reveals its presence to the enemy, and, in addition, the wireless range of a submarine is extremely limited. The present wireless range of the average submarine is one hundred miles—far too small a range to be of value, though on occasions it will allow a submarine to report information acquired at sea in the course of other duties.

Thus, though the submarine and the cruiser may still supply valuable information, it is certain that they cannot compete with the air as a medium of reconnaissance; consequently their energies should be mainly employed in other spheres, where they are likely to prove more useful.

The outstanding features of air reconnaissance are, as in land warfare:

(*a*) Speed—Early information.
(*b*) Radius of action—Wide information.

It is true that the aeroplane is sometimes influenced by the adverse weather conditions so often prevailing at sea, but this is a factor which affects all other forms of reconnaissance, though to a lesser degree. As regards darkness; the development of the parachute flare will render the aeroplane more and more efficient for observation purposes by night. The Americans have produced and used a flare of over 500,000 candle power which illumines an area of over five square miles. Thus, almost immune from hostile action itself by reason of the darkness above the flare, the aeroplane will be capable of accurate observation by night.

XI. TYPES OF AERIAL RECONNAISSANCE.—Air reconnaissance in naval warfare may be divided into three categories, of which the first may already be reckoned as obsolete for reasons given below:

i. Airships. Extreme distances.
ii. Sea reconnaissance carried out by aircraft based on shore, chiefly observation of hostile submarines and protective reconnaissance for home bases.
iii. Fleet reconnaissance carried out by aircraft based on aircraft carriers or by flying boats. Strategical reconnaissance, and tactical reconnaissance during battle.

Airships.—Though Lord Beatty declared that one airship was capable of doing the work of six cruisers,[2] it is doubtful if it has a future in

[1] "Submarines and Sea Power." C. Domville-Fife.
[2] "The First World War," Vol. II. Colonel Repington.

reconnoitering work by reason of its vulnerability to attack by heavier-than-air craft. A fleet at sea which is approached by one of these airships can despatch one or two fast-climbing single-seaters from an aircraft-carrier, and the experience of the late war teaches that, once attacked by single-seaters, the airship has little chance of regaining its base. The production of helium gas in large quantities may alter the war status of the airship, but even then it is still much affected by weather conditions. Its advantages for reconnaissance purposes at sea are obvious, but it is doubtful if these advantages will ever outweigh its inherent disadvantages. During the earlier part of the late war, there is no doubt that the German Zeppelin service performed the most valuable reconnaissance work in co-operation with the German navy, and the immunity with which the High Seas Fleet could occasionally venture forth was due entirely to excellent air reconnaissance which ensured the absence of the Grand Fleet from the waters about to be patrolled by the German Fleet. At Jutland the Germans are thought to have had some Zeppelins, but their value was lessened by adverse weather conditions. On the following day, however, they kept the Grand Fleet under observation throughout the whole day. From the beginning of 1917 onwards, Germans reconnoitering airship activity was paralyzed by our fighting aircraft, and for this reason it is difficult to foresee any immediate future for the airship in reconnaissance.

Sea or Ocean Reconnaissance.—The degree of activity in this form of reconnaissance will in some measure be dependent on the distance of enemy waters from the air bases of the ocean reconnaissance units. If the enemy naval base is within radius of action, these shore based aircraft can acquire valuable information as to his activity. In narrow seas such as the Baltic and Adriatic all reconnaissance, including a certain amount of fleet work, could be undertaken by shore-based aircraft. Submarines and merchant shipping reconnaissance, in fact all forms of ocean reconnaissance, comes within the scope of aircraft based on shore.

Fleet Reconnaissance.—This will normally be carried out by aircraft operating from mobile bases (aircraft carriers) which accompany the fleet to sea. Within this category must also be included the large flying boat which may, in the future, accompany the fleet by re-fuelling at sea. The work of fleet aircraft may be classed broadly under two headings:

(i) Before battle.
(ii) During battle.

"Before battle" will include normal fleet reconnaissance, which should report the presence or otherwise of the enemy, the presence of mines or submersible craft and their location. If the enemy fleet is seen to be at sea, the information will be passed back at once to the admiral, who will despatch immediately a strong force of fighting aircraft to secure superiority at the decisive time and point, thus enabling the reconnaissance aircraft to acquire early detailed information unimpeded by enemy opposition. Thus as he comes into battle the admiral will have accurate information as to the position and strength of the enemy, while at the same time his fighting aircraft will endeavor to deny similar facilities to his opponent. It should be mentioned that as he moved forward at Jutland, Viscount Jellicoe had only a vague idea as to the enemy's position; his cruiser reports, as he himself says, being few and inaccurate.[1] It should also be mentioned that one of the few British aircraft available sent in an accurate report by wireless concerning a part of the German Fleet, this in exceptionally unfavorable weather and at a time when the reconnoitering abilities of aircraft were lightly valued by naval authorities.

[1] "The Grand Fleet." Viscount Jellicoe.

"During battle" the commander must be kept informed on the following:

(*a*) All changes of course and of formation in the enemy's main battle fleet.
(*b*) The approach of any supporting force.
(*c*) Enemy submarines.
(*d*) Position and movement of enemy destroyer flotillas, paying particular attention to the likelihood of a combined torpedo attack.
(*e*) Position and movement of enemy battle and light cruisers if not in action with the main fleet.

In addition, during battle there is the work of the fleet-spotting aircraft. These should, if possible, operate from separate carriers, so that they will not interfere with the arrival and departure of the reconnaissance aircraft.

In regard to (*a*) above it should be noted that at Jutland, Viscount Jellicoe was unaware that the German Fleet had turned away until about twenty minutes after it had done so.[1] To this fact (in other words to poor reconnaissance on our part) the Germans owe no small measure of their escape. The Battle of Jutland proved the inadequacy of the methods of reconnaissance used.

Cruisers of other craft detailed to intercept enemy commerce-raiders should carry a seaplane, which in a single reconnaissance could cover a wide area in a short time, establishing the presence or otherwise of the enemy vessel in that area. Such a policy would undoubtedly shorten the career of these destructive vessels. Had Admiral Milne had a seaplane at his disposal he would have been able to locate the *Goeben* and *Breslau* hiding among the Ægean Islands from August 8-10, 1914, awaiting Turkish permission to enter the Dardanelles. As it was, his only cruiser, the *Weymouth*, could not search all the ground in so short a time; the enemy escaped, with what disastrous results are well known.

XII. INFLUENCE OF AERIAL RECONNAISSANCE.—In considering this subject it must be borne in mind that circumstances have shown other methods to be inadequate, consequently the air may be said to be the only means of acquiring information (apart from espionage) in naval warfare; this, therefore, is its outstanding quality. Other effects may be summarized as follows:

(i) Supplies early information which will eliminate the uncertainty previously associated with the modern naval engagement.
(ii) Reduces the possibility of surprise.
(iii) Enables the enemy to be watched consistently at his base.
(iv) Permits observation in close proximity to strong enemy forces without naval tactical support.
(v) Furnishes a means of reconnaissance against which naval craft cannot exercise deterrent effect.
(vi) Increases the area which a stronger belligerent can search in his endeavor to find the enemy. (In 1898 Cervera's Fleet was in Santiago Harbor for a month before the Americans located him.)
(vii) May hasten a more general adoption of the submersible craft. This is, however, somewhat remote and need not for the present be considered.

CONCLUSION.—In both land and sea warfare the aeroplane has shown itself to be not only a superior method of acquiring information about the

[1] "The Grand Fleet." Viscount Jellicoe.

enemy, but in many circumstances the only method. It is not only capable of saying where the enemy is, but it can report his movements and his position in depth; that is, it can do more than "feel the fringe" as the French say: it can report on enemy activity and on his reserves far behind the immediate battle front.

On the other hand it must not be supposed that aerial reconnaissance will revolutionize warfare, or render the conduct of war more easy for the commander in the twentieth century than for his predecessor of the Napoleonic era. The speed and accuracy with which the aeroplane can supply information is merely a factor which allows the individual to march with the progress of science in war. By the introduction of new and more difficult weapons, science has rendered the art of war more complicated, but science does not forget to neutralize its own efforts by placing in the hands of a commander facilities, such as the aeroplane, which will at least permit him to keep pace with its progress. Thus there is nothing about the aeroplane and its employment on reconnaissance which will lead to any modification in the principles of war. It is in the application of war to the methods of warfare, that new influences have their effect, and within these limitations this is likely to be profound. The effect of the introduction of aircraft is, therefore, similar to any other innovation of war. That is, the leading principles of war are unalterable, but the application of these principles is affected by the introduction of new weapons and new inventions.—By Flight Lieutenant C. J. Mackay in *The Journal of the Royal United Service Institute,* November, 1922.

MODERN TORPEDO CRAFT.—Before the war Great Britain and Japan were the only Powers that attached major value to the gun armament of destroyers; in fact, the tendency here was to develop these craft as very swift gun-vessels, the torpedo armament being considered as of secondary importance. The result was that many of our destroyers in 1914 could train three 4-in. guns on the broadside, but no boat mounted more than four tubes, and the majority had only two. Although this neglect of torpedo power was probably a mistake, war experience soon vindicated the wisdom of our designers in giving these boats a formidable battery of guns, for in every artillery action between the contending light forces, the Germans came off second best. This point was emphasized in the letters of Admiral von Pohl, who complained that his destroyers were unable to face the British on account of the latter's superior weight of gunfire. German boats of the war program were therefore designed to carry three and, in some cases, four 4.1-in. guns, a weapon whose heavy shell and high elevation gave it a decided advantage over our 4-in. In the twelve special destroyers, or flotilla leaders, of the *1916* type they even went to the length of mounting four 6-in. 40-cal. guns.

We on our part increased the armament of larger destroyers to four 4-in., so arranged as to give an axial fire of two guns, and with increased elevation. In the *W* class, begun in 1918, four 4.7-in. guns were mounted, together with six tubes. A number of exceptionally powerful flotilla leaders were also built; i.e., *Bruce, Campbell, Douglas,* etc., displacing 1,800 tons, with machinery of 40,000 s.h.p. for a speed of 35 knots, and an armament of five 4.7-in. guns, one 3-in. A.A., and six 21-in. torpedo-tubes.

A comparison between typical destroyers of the pre-war period and those of today reveals the striking progress which has been made in dimensions, speed, and offensive power. There are now afloat so-called destroyers which surpass the old third-class cruiser in tonnage and armament, and are, of course, immeasurably swifter. Having built about 260 boats to a standard design which was prepared before the lessons of the

war had been fully digested, the United States Navy has a type of destroyer which is inferior in artillery power to the latest foreign craft, though it carries a remarkably heavy torpedo armament. The American flush-decker class displaces 1,215 tons, can steam at 35 knots, and has a very extensive radius of action. It mounts four 4-in. guns (5-in. in a few boats) and twelve 21-in. torpedo-tubes.

Japan has lately given up the construction of second-class destroyers—that is, under 1,000 tons—and is now building only those of the first class, which range from 1,150 to 1,500 tons. Her latest boats are designed to 36 knots, and the armament may be increased to five 4.7-in. guns, with six or eight tubes. Ever since the war with Russia, Japanese boats have been heavily armed in proportion to displacement, the 4.7-in. gun having been introduced into the larger types as far back as 1908. For reasons of economy the big "torpedo cruisers" designed in 1920 have not been proceeded with. These vessels were to have displaced 2,400 tons, with a speed of 37 knots, and would have been armed with four 5.5-in. or six 4.7-in. guns and eight torpedo-tubes.

The two largest destroyers now afloat are the French *Amiral Sénès* and the Italian *Premuda*, both ex-German boats of the *1916* type. Their leading particulars are: Displacement, 2,485 tons; machinery, 54,000 s.h.p. and 35 knots; armament, four 5.9-in. guns and four 23.6-in. tubes. France, however, is building twelve destroyers of yet greater dimensions. They are of 2,553 tons, with machinery of 48,000 s.h.p. for a speed of 35.5 knots. Contradictory reports have been current respecting their armament. They were first intended to carry six 5-in. guns on twin mounts, besides two 3-in. A.A. and six 21.6-in. torpedo-tubes. It was recently stated that experiments with the *Amiral Sénès* having shown the difficulty of combining good seagoing qualities with the ponderous top-weight of large caliber guns, six or more 3.9-in. would be substituted for the 5-in. I understand, however, that the French Ministry of Marine has again reverted to the original plan of six 5-in. guns on three twin mounts. Should this be confirmed, the new boats will be the most powerful of their type in the world. The twelve smaller destroyers of the same program are also noteworthy craft according to the published details. Their displacement will be 1,475 tons; speed, 32.5 knots; radius, 3,000 miles at 15 knots; and the armament, four 5-in. guns and four 21.6-in. torpedo-tubes. There seems no doubt that French naval authorities have been much impressed with the merits of the *Amiral Sénès*, which has obviously influenced the design of all their new destroyers.

Italy has not been behindhand in developing torpedo vessels of great speed and artillery power. In certain boats of the *Aquila* class, originally built for the Rumanian Government, but modified when taken over for Italian service, a battery of three 6-in. guns and four 3-in. guns was mounted, with four 18-in. tubes, on a displacement of only 1,556 tons, the speed being 36.5 knots. A larger and more seaworthy design is that of the *Leone* class, now completing, details of which are as follows: Displacement, 2,195 tons, speed, 34 knots; armament, eight 4.7-in. 45-cal., two 3-in. A.A., and six 18-in. tubes. Assuming the 4.7-in guns to be twin-mounted on the center line, each of these boats will be capable of discharging about eighty 48-lb. shell per minute, a volume of fire which, for a destroyer, would have seemed fabulous not many years ago. Under favorable conditions of sea and visibility they should be able to engage even a small cruiser without undue risk to themselves.

But, in laying down the characteristics of torpedo vessels, regard must be paid to the service on which they are likely to be employed. A type which was eminently suited to Mediterranean service might be ill-adapted for operations in northern waters, and totally unfitted for patrol work on

the ocean routes. It may happen, therefore, that small craft whose fighting value on paper is abnormally high for their tonnage would be unable to work their guns in a seaway, and thus fall victims to an opponent who made better weather of it and could fight his lighter armament with full effect. So far as the British Navy is concerned, it would seem the wisest course to fix a limit for tonnage craft, say, 1,500 tons, and not seek to embody the military attributes of a cruiser in a vessel too small to stand the rough-and-tumble conditions of deep-sea faring. The modern history of British naval construction furnishes numerous examples which ought to serve as a corrective to this tendency. Our latest flotilla leaders are reported to be successful in every respect, but they cost a great deal of money, and are, perhaps, unnecessarily large and powerful. When the time comes to resume such construction we shall be well advised to build many medium boats rather than a few super-destroyers, and not attempt to compete with other navies in the impossible task of pouring a quart of fighting power into a pint measure of displacement.—Hector C. Baywater, in the *Naval and Military Record*, 29 November, 1922.

THE QUESTION OF THE STRAITS.—The question of the Dardenelles has, as Lord Palmerston put it, "been dangling about the council tables of Europe" for a century and a half. It is up again at the council table at Lausanne, and the probabilities are that it will still be dangling about the council tables of Europe, from time to time, for the next few generations unless the Allies make a firm and united stand at Lausanne.

The Dardenelles and the Bosporus constitute a narrow waterway lying entirely within Turkish territory, and the whole of it is within the three-mile limit, measuring from the Turkish shores. Under these circumstances the Straits might be considered as Turkish territory under the absolute jurisdiction of the Turkish Government. Taking this view of the case, the Turk would have the right to close the Straits and to put up a sign "Keep Out; This Means You!" or, as he is a prohibitionist, he might, according to recent American legal opinions, compel all ships to jettison their wet goods before passing through the Straits from the Ægean to the Black Sea.

On the other hand, these Straits constitute the only passageway between two great seas, and the doctrine of the freedom of the seas holds that, as the seas themselves are free and open, the passageway connecting them should also be free and open. The United States has always maintained this doctrine in regard to the Dardanelles and the Bosporus. The other great powers entered into various treaties with the Ottoman Empire by which it was agreed that when the Sublime porte is at peace, the Sultan should exclude all warships from the Straits—not only that he could and should do it but that he must do it. The American Government has never been a party to any of these treaties and has consistently refused to be bound by them. The attitude of this Government has been that we don't want to hurt the Sultan's feelings unnecessarily, but that we will send our warships through the Straits any time that we get good and ready.

One of our earliest ventures in those troublous waters was in 1801, when Commodore Bainbridge, in command of the United States ship *George Washington*, arrived at the entrance of the Dardanelles. Feeling doubtful whether he would be granted permission to enter the Straits, he determined to enter first and talk about it afterward. When he arrived at the first "Castle" guarding the entrance he pretended to take in sail as though about to drop anchor and began firing a salute. The "Castle" courteously replied with a salute and, under cover of the smoke, Bainbridge crowded on all sail, passed up the Strait, and was well out of range before the Pasha in command of the "Castle" could bring his guns to bear. The

Sultan gave orders that the Pasha should be promptly executed, but Bainbridge interceded for him and finally everybody was forgiven, making a happy ending to the comedy.

However, we have not made a habit of "running the Straits." We have never had any imperative reason for sending warships through the Straits and, consequently, have refrained from raising the question as to our right of way.

On about half a dozen occasions some of our naval commanders while cruising around in that neighborhood have taken a fancy to visit Constantinople just for the fun of the thing, but the Sultan has always politely declined to permit them to enter the Dardanelles. On one occasion the United States ship *Shenandoah* and a French vessel were hanging so close around the entrance to the Straits that the commander of the Turkish "Castle" apparently got nervous. At any rate, the Pasha loosed off a shot. It didn't hit anything, but its echo was heard in Washington, and our Secretary of State, in response, fired off a dispatch to Constantinople reminding the Sultan of the fact that "the United States are not a party to the convention which professes to exclude vessels of war from the Dardanelles," and are, consequently not bound by that treaty, although "disposed to respect the traditional sensibility of the Porte as to that passage." The Secretary of State further intimated that the Pasha was a rather poor shot, but that some day he might hit somebody, which would "precipitate a discussion, if not a serious complication."

The attitude of the American Government toward the Straits was rather well outlined by our Department of State in 1871 in these words: "The Black Sea, like the Baltic, is a vast expanse of waters which wash the shores not only of Turkish territory, but those of another great power who may, in time of peace, at least, expect visits from men-of-war of friendly states. It seems unfair that any such claim as that of Turkey should be set up as a bar to such an intercourse or that the privilege should in any way be subject to her sufferance."

At the present day there is even stronger reason for insisting on the freedom of the Straits. In 1871 the whole shore line of the Black Sea was occupied by only two nations—Turkey and Russia—but since then other nations have come into existence on the Black Sea and on the rivers tributary to it. The Black Sea is no millpond. Its shore line has an extent of about 2,000 miles (being considerably longer than our whole Atlantic Coast) and into it pour the waters of four of the greatest rivers in Europe—the Danube, the Dnieper, the Don and the Dniester—all of which are longer than the Rhine.

The question of the Straits is no longer a "local issue" in which Turkey and Russia are chiefly concerned. It is a matter of extreme importance to half a dozen other states situated on the Black Sea and its tributaries and also a matter of importance to us and to every country which has intercourse with those states.

If the guardianship of the Straits be restored to the Turk he can "bottle up" the countries of the Black Sea Basin whenever he feels so disposed.

After the Armistice the Allies abandoned their old system and adopted the principle which the United States had always advocated—the principle of the freedom of the Straits. They agreed that the Straits should be open to warships as well as to merchant vessels, both in time of peace and in time of war, and they created a "Zone of the Straits" under the Government of an Interallied Commission. This seems about the best way to handle the situation, but the Nationalist Turks don't like it. They insist that they themselves must govern the Straits, and they promise to guarantee such rights of passage as may be mutually agreed upon. One

great difficulty about that proposition is: Who is going to guarantee the Turks' guarantee? Even if all fortifications were removed from the zone it would be a comparatively easy matter for the Turks to close the Straits by mining or obstructing the narrow channel. The Dardanelles at Chanak are only 1,400 yards wide and the Bosporus just above Constantinople, is only 550 yards from shore to shore.

Under pressure from United States and the Allies the Turkish delegates at Lausanne have been induced to modify their claim to exclusive jurisdiction over the Straits. Soviet Russia, however, is still doing her best (or worst) to stiffen the Turks' demands—not that she wants her old enemy and present chum to be permanently reinstated as janitor of her south door, but because, when the time is ripe, she will find it easier to take the Straits away from the Turk than it would be to take them away from the League of Nations.

Strong Interallied control at the Straits seems the only wise solution of the matter. The American Government has forcefully reiterated the American principle that the Straits should be open at all times to warships as well as to merchant ships, and if the Allies don't weaken at Lausanne we may hope that the question of the Dardanelles will be definitely settled and cease to "dangle around the council tables of Europe."—James G. Whiteley in the *Baltimore Evening Sun*, 13 December, 1922.

CURRENT NOTES AND PAPERS

"The *Olympic* Stern Post Repairs."—(Some interesting particulars of the repairs affected, illustrated with photographs).—*The Marine Engineer and Naval Architect*, November, 1922.

"Surveying With Aircraft Photographs"—(Discussion of three of the four steps involved in the making of topographic maps; (1) Establishing control; (2) Gathering surface data; (3) sketching topography; (4) Reproduction of the map.) By James W. Bagley in the *Journal of the Western Society of Engineers*, December, 1922.

NOTES

Pertinent articles in:

Current History for December:

1. "The Ex-Kaiser Scourged: An Analysis of the Memories of William Hohenzollen," by Robert Lansing, ex-secretary of state.
2. "America Again Defenseless," by Lieutenant H. B. Mayer, U. S. A.
3. "The Navy as a Protective Investment," by Admiral R. E. Coontz, U. S. Navy.
4. "The World Tribunal in Action," by R. L. Buell. (The first judicial decisions of the Permanent Court of International Justice—Powers of the Court, etc.)
5. "The United States and Latin America," by Henry Woodhouse. (Steps taken by the U. S. to meet the new conditions created by the World War—Estrangement of three years now being overcome.)
6. "Iraq as Great Britain's Ally." (Full text of treaty, regarded as step toward grant of self-government.)

The Nineteenth Century for November:

1. "Political Strategy: Mesopotamia," by Major-General Sir John Davidson. (A review of the situation in the Middle East, and more particularly the British position in Iraq.)
2. "Reparations: and the Disastrous Balfour Note," by W. T. Layton, Editor of *The Economist*. (A short review of the situation and pointing out that the only hope for Great Britain is "to reverse in fact—however the form be disguised—the policy of the Balfour Note.")

3. "America and Peace," by D. Litt, European Manager of the Foreign Service of the Chicago *Daily News*. (Why it is wrong to speak of America's isolation?")

4. "The Freedom of the Straits," by Major-General Sir George Aston, K. C. B. (Great Britain's obligations under the Treaty of Sèvres, and comparison with the Panama Canal, Suez Canal, Straits of Gibraltar, etc.)

Current articles in *The Nineteenth Century* for December:

"The Vital Eastern Problem: Past Mistakes and Present Dangers," by Major General Sir Herbert Mullaly. (A brief summary of a few of the more salient aspects of the Turkish-British problem from early times.)

"The Admiralty in War: and its Civilian First Lords," by Rear Admiral Sir S. Eardley-Wilmot. (A brief review of certain features of the Great War which seem to indicate that naval administration has certain defects capable of removal.)

NOTES ON INTERNATIONAL AFFAIRS

FROM NOVEMBER 23 TO DECEMBER 23

PREPARED BY

ALLAN WESTCOTT, Professor, U. S. Naval Academy

WORK OF LAUSANNE CONFERENCE

PROBLEMS CONSIDERED.—The chief problems in the Near Eastern settlement taken up at Lausanne were as follows: (1) the control of the Straits; (2) the protection of Christian minorities in Turkey, involving the Turkish claim to western Thrace and the expulsion of Greeks from Constantinople and elsewhere; (3) the question of trading privileges and in particular the control of the Mosul oil fields in the northern part of the British mandate of Iraq or Mesopotamia. Russian delegates were allowed to take part only in the discussion of control of the Straits.

TRADING PRIVILEGES.—On November 25 Ambassador Child stated that the position of the United States in the Turkish question was for the "open door" and opposed to any settlement, private treaty, or bargain, which should give to one nation or group of nations special privileges in the exploitation of Turkish trade or resources. England two days later declared her acceptance and support of this principle.

This declaration had a special bearing on the disputed Mosul oil region near the boundary between Iraq and Turkey. In a later statement, Great Britain made it clear that she did not surrender her special claims to concessions in this region granted prior to the war and accepted by France and Italy in the agreement at San Remo.

FREEDOM OF THE STRAITS.—The original Turkish proposal, strongly backed by Russia, was that the Straits should be opened to commerce, closed to war vessels in peace or war, and fortified by the Turks as in the past. Turkey, however, at once showed willingness to compromise with the Allies' demand for demilitarization of the Straits and free passage for naval vessels, as well as merchant craft, in both peace and war. The United States representatives favored complete freedom of the Straits, but in a note presented by Ambassador Child stated their preference for supervision by Turkey rather than an international commission created by the League of Nations. This view was disregarded, and upon the insistence of the Western powers the Turkish delegates on December 21 signified acceptance of the following plan (in summary):

A. *Freedom of Straits*

I. *To all merchant vessels* and civilian airships, complete in time of peace, and complete also in time of war, except that if Turkey is a belligerent she may enforce her rights under international law to stop enemy and contraband trade.

II. *To all war vessels* and military airships, complete in time of peace by day and night, with the limitation that no power can send through the Straits a fleet stronger than the strongest fleet of the Black Sea States at the time.

In time of war, with Turkey neutral, complete freedom, with the same limitation as in the preceding paragraph. (While this would seem to limit the size of the entering fleet to that of the strongest of the Black Sea powers, it is further provided, somewhat obscurely, that "These limitations will not be applicable to a belligerent power to the detriment of its belligerent rights in the Black Sea.")

With Turkey a belligerent, the privilege to Turkey of fortifying the Straits to prevent the passage of enemy ships, provided this does not interfere with the passage of neutral war vessels.

B. *Demilitarized Zones*

I. All the waters from the Mediterranean to the Black Sea; all the Gallipoli peninsula, and a strip twenty kilometers deep on the Asiatic side of the Dardanelles; all the islands in Marmora; on the Bosporus, strips fifteen kilometers deep on both shores; the islands of Samothrace, Lemmos, Imbros, Teneados, and Rabbit in the Ægean.

Turkey to have freedom to pass armed forces through the demilitarized zones, to use the Straits for her fleet and for a naval base, to have a garrison of 12,000 in Constantinople.

Turkey to be free to fortify the Straits in time of war.

C. The Straits Commission will consist of representatives of Turkey, England, France, Italy, Japan, Russia, Rumania, Greece, Bulgaria, Jugoslavia and also the United States if she chooses, with the Turkish representative as president.

PROTECTION OF MINORITIES.—The Turkish proposal of a plebiscite in Western Thrace was rejected. Turkey subsequently showed willingness to accept the Allied solution providing for a twenty kilometer demilitarized zone between Eastern and Western Thrace along the Maritza River, with an exit to the Ægean for Bulgaria via the railway through this zone to the port of Dedeaghatch. Both Lord Curzon and Ambassador Child made strong statements insisting upon the protection of Christian minorities in Turkey. On December 14 Ismet Pasha agreed that Turkey would join the League of Nations and that the Christian minorities in Turkey should be protected by the same guarantees that were provided by the League for minorities in countries of Central Europe. This indeed was the original

Turkish position, in opposition to special surveillance by a League Commission in Constantinople.

GREEK LEADERS PUT TO DEATH.—On November 28, by order of a Greek military tribunal, former Premier Gounaris and five of his Cabinet, together with the former head of the army in Asia Minor, were put to death. Two other generals were sentenced to penal servitude for life. The charges against the cabinet members were that they had by violent means stifled public opinion, concealed the danger arising from Constantine's restoration in order to maintain themselves in power, and by their pretended offensive against Constantinople, fatally weakened the forces in Asia Minor. Prince Andrew, brother of Constantine, escaped punishment by the defense that as a general he was a figurehead without real responsibility.

Efforts were made by the diplomatic corps in Athens to prevent the executions. The British and other governments immediately afterward broke off diplomatic relations with the Greek government.

REPARATIONS AND ALLIED DEBTS

DECISION POSTPONED AT LONDON.—A meeting of the French, British, and Italian premiers was held in London on December 10-11. Revised German proposals for a reparations settlement presented by Chancellor Cuno was declared unsatisfactory and a reply was sent to that effect. In fact the German proposals merely asked for at least a two-year moratorium and stabilization of the mark by foreign and internal loans.

In view of the plainly stated disapproval of both Great Britain and Italy, Premier Poincaré was led to postpone his proposed occupation of the Ruhr region as a protective guarantee. Premier Bonar Law set the Balfour note aside and indicated in general terms his willingness to consider cancellation of the French debt to England provided this would lead to a settlement of the whole reparations question satisfactory to England.

The proposed Brussels Financial Conference was called off and a general conference was set for January 2 in Paris, to reach definite decisions before January 15.

REPARATIONS SETTLEMENT BEFORE LOAN.—The return of Ambassador Harvey for consultation in Washington, and statements from official sources in Washington led to a general belief that the American government was about to take an active part in the reparations settlement. During a trip to Washington in December, Mr. J. Pierport Morgan was consulted by the German Ambassador regarding the possibility of a foreign loan to Germany.

On December 18 the J. P. Morgan Company announced that their attitude regarding a German loan was the same as last summer, that is, that no such loan could be considered "unless and until the reparations question was settled." The United States government on the same date made a similar announcement.

GREAT BRITAIN AND IRELAND

IRISH FREE STATE ESTABLISHED.—On December 5 the Irish Free State Constitution Bills passed the House of Lords, received the royal assent, and became the law of the land. Timothy Healy, an Irish lawyer and politician, associated from Parnell's time with the movement for Irish separation, was appointed Governor General. On December 12 the Irish Senate and Assembly met in joint session to hear the King's message and the Governor General's opening address.

During December the Free State took more drastic measures against republican insurgents. After the murder of Brigadier General Hales on December 8, the Government on the following day put to death four irregular leaders who had been in prison since the capture of the Four Courts last July.

RUSSIA AND NORTH EUROPE

FAILURE OF DISARMAMENT CONFERENCE.—A conference on limitation of armaments met in Moscow on December 2 with representatives of Finland, Esthonia, Latvia, Lithuania and Poland. Rumania refused to attend unless Russia recognized Rumanian annexation of Bessarabia. The armies of the six smaller states were estimated at about 505,000; that of Russia at somewhat less than 1,500,000, with a field army of about 800,000. Russia proposed to cut this to 200,000, or seventy-five per cent, if the other states would make corresponding reductions. This the smaller powers refused to do without guarantees against attack. Hence the conference ended without results, though Russia is likely to make reductions in any case owing to the cost of feeding troops.

POLISH PRESIDENT ASSASSINATED.—On December 16, one week after his election, President Gabriel Narutowitz of Poland was shot and killed by an insane artist. Narutowitz, a relative of General Pilsudski, was elected by a small margin of votes supplied by alien minority parties in Parliament. He was opposed by the Nationalists. In subsequent elections held on December 20, Stanislas Wojcieschowski, a moderate of the Farmers' Party, was chosen to fill the vacant presidency.

RATIFICATION OF NAVAL TREATIES

FRANCE CHAMBER DELAYS RATIFICATION.—Paris, Dec. 14.—A renewal of the Government's promise that the Washington Naval Treaties would shortly be brought before the Chamber for debate, was made today by the Minister of Marine during a discussion of the naval estimates for the next year.

The discussion will not come before January at the earliest, and then only if the commissions are finished with their work.

M. Briand, however, had a word to say in favor of discussion of the naval accord as soon as possible. At Washington, he said, the naval problem had been studied from two points of view, offensive and defensive. So far as the offensive was concerned France had shown herself willing to concede every demand. If there had been a fluctuation of opinion it was

because it was wished by some to bind France to a proposition between offensive and defensive tonnage. On that point, he continued, France did not wish to give way.

"We have pointed out the world situation," he said, "and shown that if we have no doubts about the intentions of our friends and allies, the state of the whole world is not quite so reassuring. The possibility of our adversaries constructing large numbers of light ships and the extent of our coasts are for us very imperious reasons for not limiting construction of a defensive nature, as our national sovereignty is at stake. Our English, American and Japanese friends have since taken this into account and the polemics of a year ago are now forgotten."

The Minister of Marine, thanking Mr. Briand for his intervention, declared his view was that of the Government.

Coming the day after publication of the report of the Appropriations Committee, the House of Representatives debate shows exactly how France will regard a proposed new conference at Washington to limit auxiliary naval construction, on which no limit was placed last year. The French argument will be that the whole program of light cruisers and submarines now being budgeted for within the financial possibility for construction in France in the next ten years are simply defensive weapons.—15 December, *New York Times.*

FAR EAST

CHINA TAKES OVER SHANTUNG.—On December 10 Japan evacuated Kiao-chau and turned over the civil and military administration to the Chinese government. The final arrangement was that China should pay Japan forty million yen for the Shantung Railway in fifteen-year Chinese Treasury notes at six per cent, and sixteen million yen for public property in Kiao-chau. At the time of the evacuation, Chinese bandits in the Shantung region threatened to take possession of the city of Tsing-tau.

In the meantime the Chinese government at Peking has weakened and swung back into the hands of the military leaders. Premier Wang Chung-tau and Foreign Minister Wellington Koo were impeached after scandals connected with a loan from the Sino-Italian Bank, and on December 19 General Chang Shao-tseng became premier with the support of General Tsao Kun and other militarist elements in Peking.

LATIN AMERICA

CENTRAL AMERICAN CONFERENCE.—The Conference of Central American States meeting in Washington, voted on December 18 to postpone for a year the question of political union, leaving the matter to be studied and reported upon by a sub-committee. The conference then adjourned pending the completion of a report by the sub-committee on plans for a tribunal to settle disputes among the powers concerned.

REVIEW OF BOOKS

PRACTICAL ADVANCED NAVIGATION, by Charles H. Cugle. (Published by E. P. Dutton and Company. Price $3.00). A Review by Commander John Downes, U. S. N., Head of Department of Navigation, U. S. Naval Academy.

For "rule of thumb" navigation this work appears to be what is required. As the author announces, no effort has been made to delve into theory, but rules have been laid down in simple language which if followed implicitly would lead the average sailorman to his destination. Examples are given of every practical kind of deep sea navigation. No effort has been made to follow out the correctness of the problems presented, though it is noted in Example 1, page 2, that the author himself did not follow his own rule: viz., Use the *supplement* of the hour angle when the latitude and declination are of different names. In the chartlets no effort has been made to apply current. For instance in the chartlet covering Problem 1, Marcq St. Hilaire Method, page 47, the current (the term current being used to represent the combined effect of wind, sea, actual current, bad steering, foul bottom, etc.), obtained as represented by the altitude differenced at time of first sight, should be applied proportionately to the D. R. position for second sight. This would result in a very much smaller altitude difference for the second sight and give the rule of thumb navigator more confidence in his work.

In the chartlets covering two simultaneous observations the author unfortunately picked out two stars whose azimuths were too nearly opposite, giving too acute an angle to the plotted lines relative to each other. It should be explained in the text that it is desirable to use two bodies whose azimuths or the reverse of either one differ by at least sixty degrees. When the angle is less than this, error in position is greatly increased through small error in altitude differences.

The book should prove very useful to the merchant sailor or yachtsman who does not care, or has not the time, to delve into the theory of advanced navigation. There are numerous good books already available from which the theory may be obtained.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Membership Life, regular and associate, 4766; new members, 42; resignations, 127; deaths, 1.

Practically the whole service receives the benefit of the PROCEEDINGS, yet many officers who read it monthly are not members, and therefore contribute nothing to the support of the Institute.

The publication of the PROCEEDINGS involves a monthly deficit that is a tax on the resources of the Association. As this deficit can best be overcome by an increase in the membership roll, the loss of 369 members during the last year is a serious matter. However, the gradual decrease in membership during the last few years may be looked upon as an aftermath of the war. Earnest effort is being made to counteract this, and there are encouraging signs that soon the tide will turn the other way. If the Service will give the Institute a little more support, it will not be necessary either to curtail the PROCEEDINGS or to increase the yearly dues. *Members are requested to urge non-members to join, and send subscriptions for the* PROCEEDINGS *to their friends outside the Service. These may begin with any month desired.*

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Special Notices See also following pages for extracts from the constitution, notice regarding prize articles, and suggested topics.

H. G. S. WALLACE,
Commander, U. S. Navy, Secretary and Treasurer.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It is now in its fiftieth year of existence. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers upon subjects of interest to the naval profession, as well as by personal support.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of life, regular, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy, subsequent to joining the Institute, will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control. To be declared elected, they must receive the affirmative vote of three-quarters of the members represented at regular or stated meetings, either in person or by proxy.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nomination shall be submitted to the Board of Control. The Board of Control will at each regular meeting ballot on the nominations submitted for election and nominees receiving a majority of the votes of the board membership shall be considered elected to membership in the United States Naval Institute."

Sec. 8. The annual dues for regular and associate members shall be three dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be forty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

Sec. 10. Members in arrears more than three years may, at the discretion of the Board of Control, be dropped for non-payment of dues. Membership continues until a member has been dismissed, dropped, or his resignation in writing has been received.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published monthly. Subscription for non-members, $3.50; enlisted men, U. S. Navy, $3.00. Single copies, by purchase, 50 cents.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.